Rubber Journal and International Plastics

136 NO. 17 APRIL 25 1959 Price 1s. Weekly

UNIVERSITY OF MICHIGAN
MAY 1 1959
ENGINEERING LIBRARY

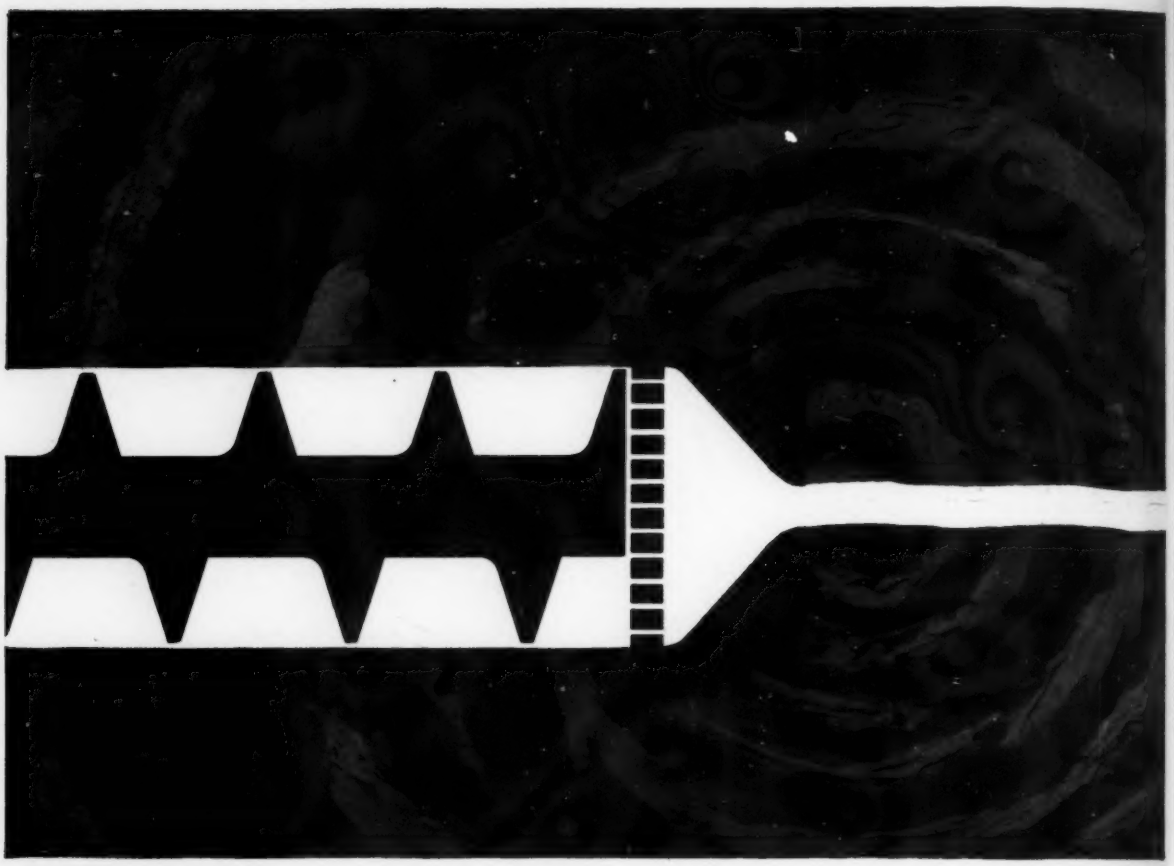
Away with dirt and dust

BAYTOWN MASTERBATCHES

contain carbon black already dispersed in GR-S.
This largely eliminates the need to handle carbon black as such,
enabling factories and machines to be kept much cleaner.
Specifications and other details are available.

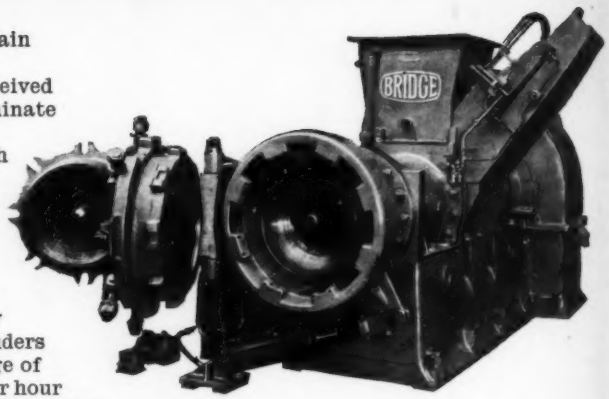
ANCHOR CHEMICAL COMPANY LTD - MANCHESTER 11

London Office: Grand Buildings, Trafalgar Square, W.C.2
Scottish Agents: J. & G. Hardie & Co. Ltd., 178 Fulton Street, Glasgow W.3
American Liaison and Service Branch: British Anchor Chemical Corporation, 366 Madison Avenue, New York 17, N.Y.



Bridge Extruders are an essential link in the chain of continuously expanding production. Designed for the processing of rubber stocks received directly from Bridge-Banbury Mixers, they eliminate the bottlenecks of numerous mill operations.

Being fully automatic, with drive to match the mixing cycle time of the Bridge-Banbury Mixer, they require no operators, occupy comparatively little floor space, improve manufacturing efficiency and reduce handling costs. Designed to maintain round-the-clock operation at completely stable thermal conditions and ensure optimum quality production at all speeds. Bridge Precision Extruders for all purposes are available in a complete range of sizes from one capable of extruding 20,000 lbs. per hour of uniform stock, down to small special-purpose extruders.



Bridge Automation is continuous production.

We invite you to discuss your technical problems or requirements with us . . . without the slightest obligation on your part.

BRIDGE

PRECISION EXTRUDERS

. . . ACCLAIMED AS THE ULTIMATE IN PRODUCTION EFFICIENCY

DAVID BRIDGE & CO. LTD. CASTLETON, ROCHDALE, LANCASHIRE

In technical association with Farrel-Birmingham Co. Inc. Ansonia, Conn., U.S.A.

'Phone Castleton, Rochdale, 57216 'Grams: Coupling. Phone Castleton Lancs.

London Office:
Broughton House, 6, 7, 8 Sackville St. Piccadilly, W.1. 'Phone Regent 7480. Grams & Cables: Ederaceo, Piccy, London.

Editorial Director
JOHN D. COPEMAN

Editor
RICHARD ROWLAND

Consultant Editor
H. J. STERN
B.Sc., Ph.D., F.R.I.C., F.I.R.I.

Advertising Director
C. B. COPEMAN

Advertising Manager
A. S. KINGHAM

UK Area Representatives

M. J. Whelan, London

R. P. Finucane, Eastern Counties, Huntingdonshire, Hertfordshire, Bedfordshire, Buckinghamshire, Northamptonshire, Kent, Surrey and Sussex (Operating from London Office)

L. Quy, South and West of England and South Wales (Operating from London Office)

A. J. Legg, 55 Lee Lane West, Horsforth, Nr. Leeds. Tel. No. Horsforth 3845, North-East England, Lancashire, Yorkshire, Nottinghamshire, Lincolnshire and Derbyshire

W. Brown, 13 Allerton Road, Southport, Lancashire. Tel. No. Southport 5121, Scotland

E. A. Daniel, 'Brockenhurst,' 18 Thornhill Park, Streetly, Sutton Coldfield, Warwickshire. Tel. No. Streetly 1485, Midlands (excluding Staffordshire North of the A.5), Cheshire and North Wales

E. Burgess, 4 Kelvin Street, Maybank, Newcastle-under-Lyme. Phone 64678, Staffordshire North of the A.5

Foreign Representatives :

R. K. Larke, 7 Rue Pilaudo, Asnieres (Seine), France. Tel. No. Gresillons 42.24

G. Arnold Teesing, Rubensstraat 68, Amsterdam, Z (Netherlands). Tel. No. 727913

Albert Milhado & Co., G.m.b.H., Konigsallee 33, Dusseldorf, Germany, and Pompstraat 2, Antwerp, Belgium

Massimo Fano, Via V. Monti 14, Milan, Italy. Tel. No. Milan 808135

Rubber Journal and International Plastics

Volume 136 **Price 1s. Post free 1s. 4d.** **No. 17**

IN ITS 75th YEAR

April 25 1959

Editorial

NOTES OF THE WEEK 613

Articles and News

SP BROWN CREPE 615
WHAT ARE WE TALKING ABOUT? 617
HUNGARIAN RUBBER AND PLASTICS 618
MATERIAL DEVELOPMENTS 620
PLASTICS EXHIBITION 621
THE INDUSTRY IN TURKEY 622
TYRE SYMPOSIUM 632

Features

RUBBER AND PLASTICS IN SOUTH AFRICA 622
VIEWS AND REVIEWS 624
QUESTIONS CORNER 628
MEN AND MATTERS 629
RJIP CROSSWORD 632
PLANTATION COMMENTARY 633
RUBBER STATISTICS 636
PATENT SPECIFICATIONS 638
RUBBER AND PLASTICS STOCK MARKET 640
RUBBER MARKETS 641
INDUSTRY INTELLIGENCE 642
FUTURE EVENTS 643

Classified Advertisements . . . 645 Advertisers Index . . . 650

MACLAREN HOUSE, 131 GREAT SUFFOLK STREET, LONDON, S.E.1
Grams : 'Buns, Souphone, London' Phone : HOP 5712
Annual Subscription, including Postage: United Kingdom and Oversea, £2 15s.; Index (half-yearly), 10s. per annum extra. Published weekly. Registered at GPO as a Newspaper. Registered for Transmission by Canadian Magazine Post. Entered as Second Class matter at Post Office, Boston, Mass, USA, under the Act of March 3, 1879 (Sec. 397 P. L and R.)

Hey there, Mr Pennysaver!

Mr. Pennysaver is a familiar figure in the business world. He is the man who is always trying to find cheaper basic materials, because he knows that these mean lower production costs and hence bigger profits right down the line.

The danger is, that by shopping in the bargain basement, he may lose out on quality.

But if it's P.V.C. compounds and sheeting Mr. Pennysaver is looking for, he can avoid this danger quite simply—he can come to see us at Phoenix.

Here Mr. Pennysaver will find whatever he wants—P.V.C. compounds, sheeting and tapes of all kinds for all purposes. What is even more to his liking, he will be getting top quality materials while paying the lowest price.

So welcome to Phoenix, Mr. Pennysaver: welcome all who, like him, are interested in cutting costs without cutting quality.

PHOENIX **P.V.C. COMPOUNDS**

Phœnix Rubber Co Ltd, Slough, Buckinghamshire. Telephone: Slough 22307/9

OAS3M

NOTES of the WEEK

'Yield Barrier'

STATEMENTS continue to be made stressing the triumphant immediate future of natural rubber. In Kuala Lumpur recently, Mr R. M. E. Michaux, chairman of the International Rubber Research Board, expressed his confidence in the 'ultimate triumph of natural rubber over synthetic.' It was a question, he said, of which of the two could progress quicker and produce cheaper. The cost of production of natural rubber was already cheaper than synthetic and with increased output through replanting and new planting of high yielding material, the fruits of scientific research, the cost of production would go down still further. It was unlikely that the cost of production of synthetic would be reduced in view of the fact that the cost of materials used in its manufacture tended to increase with the years. Malaya's replanted estates, said Mr Michaux, should produce an average of 1,500 lb. per acre. He went on to talk of what he described as the 'yield barrier.' There were clones that would yield up to 2,000 lb. an acre and beyond but after a year or two under the tapping knife the yield invariably declined to about 1,000 lb. 'I have now very good reasons to think, after visiting the research centres the world over, that we can break that yield barrier. It will not be long before we can produce a clone that will give us 2,500 or even 3,000 pounds per acre. But to achieve this objective all producing nations must pool their scientific knowledge,' he said. Along these lines, there is certainly ground for optimism.

EEC Progress

THE second general report issued by the European Economic Community mentions a number of matters of interest to countries other than 'The Six.' Estimates are made of the likely effects of the first tariff cuts and quota enlargements which took place on January 1. Thus, the trade of France with the other five Community countries is expected to increase by 15%, with increases for other parts of the Community put at 3 to 5%. Of interest, too, are the studies made towards means of freeing capital movement between the six. The new finance institute, the European Investment Bank, has published a programme of aid totalling $24m divided between four major projects. The problems of labour supply have been tackled on three fronts. A convention has been adopted under which workers do not lose social security rights by crossing an international frontier. Draft regulations for re-employment and resettlement of unemployed workers have been prepared, and a plan has been worked out for a system of international labour exchanges. Plans for a common transport policy with special reference to the ending of discrimination are also in preparation. All in all, there will be plenty to be debated when the 142-man European Parliamentary Assembly meets in June.

UK in NY

BRITAIN'S trade with the United States, and the prospects of further enlarging the market, was the concern of several members in the House of Commons last week. It was pointed out by Mr Vaughan-Morgan that, whereas in 1948 UK exports to the US had totalled £63.5m the 1958 figure was £272.5m, which makes the US the largest single export market for UK goods. There is now news of an imaginative and intelligent move by the Federation of British Industries which is to organize a British Exhibition in New York in June of next year. The exhibition, to be held in New York's most modern exhibition building, the Coliseum, will last for a fortnight and is expected to be the largest ever staged by one country within the confines of another. Further details of what promises to be a magnificent effort can be had from the FBI subsidiary, British Overseas Fairs Ltd.

Special Report

NOTED in the latest of the leaflets (to date there have been 29 of these) issued by the Accident Prevention Committee of the National Joint Industrial Council for the Rubber Manufacturing Industry is the achievement of a new safety record. The leaflets, written by Mr R. W. Lunn and referred to on other occasions in these columns, must have had no small effect in this really notable accomplishment. The report reads as follows: 'The frequency figures for the month of February 1959 are available. We worked for 9,174,760 hours with lost time accidents numbering 61. This gives a frequency of 0.66. This is the best figure which we have ever recorded. It may be worth something to discover what part you played in this achievement.' As the indefatigable Accident Prevention Committee would probably comment, while the setting up of a new low record figure is undoubtedly a matter for satisfaction, there must be no complacency.

NEWS *Briefs*

US POLYETHER FOAM — THAI/BRAZILIAN TRADE
JAPANESE IMPORTS — CANADIAN TYRE PRICES
MALAYAN SALES TO INDIA — DOW SUBSIDIARY

●**United States**—Sales of flexible polyether foams will rise to at least 200 million lb. in five years from now, or four times the present volume, Mr William O'Neil, the president of General Tire and Rubber Co. has predicted. This, he said, would be in addition to an estimated 100 million lb. of rigid polyether foams by that time. Mr O'Neil's prediction came as General Tire announced the development of an improved 'one-shot' method of producing the plastic foam, which is used for cushioning and insulation. The new method reduces manufacturing time and improves product quality.

●**Honduras**—A 600-acre rubber plantation, established about nine miles from Tela, Honduras, during World War II, has been expanded and is in commercial production, according to the US Department of Agriculture. The property now has about 67,000 bud-grafted trees with an estimated annual production rate of 240,000lb. This is the only rubber plantation now operating in Honduras, except for a 50-acre development near La Ceiba and a small experimental plot near Tela.

●**Ceylon**—A recent estimate issued by the Director of Census and Statistics puts the total population of Ceylon at 9,361,300, of which 8,213,000 are citizens of Ceylon and 1,147,500 non-citizens (mostly Indians). Persons over 21 years and under number 4,615,800 and 4,745,500 respectively.

●**Switzerland** — According to local Press reports, Dow Chemical Co. is to establish a subsidiary in Basle. The stated object of this subsidiary is the financing of the overseas interests of the Dow concern particularly in the European economic area. The fully paid capital of the subsidiary will amount to Sw. frs. 25 million.

●**Japan**—Four Japanese rubber trade organizations have announced a decision to establish a special committee to investigate alleged cases of shipments to Japan of natural rubber which did not conform to specifications. A spokesman for the Japan Rubber Importers Association, one of the four organizations, said the allegations were concerned particularly with Malayan rubber supplied to Japan. He said it was estimated that about 64% of the rubber imported by Japan in recent months failed to live up to the standards specified by the New York rubber market.

●**Ceylon**—If proposals put forward by the Minister of Labour are accepted it will in future be the Government's policy that no 'village' (*i.e.* Sinhalese) labour on rubber and tea estates shall be replaced by 'imported' (*i.e.* Indian) labour and that at least 50% of future vacancies on estates shall be reserved for local labour.

●**Canada**—A 5% price increase on tyres and tubes has been announced by the Goodyear Tire and Rubber Co. of Canada. A spokesman said the increase was due to higher costs of materials and labour and new federal taxes. Goodyear last raised prices in 1955.

●**Malaya** — Malaya wants to expand her sales of rubber to India, Mr J. E. Bush, manager of the Natural Rubber Development Board said in Kuala Lumpur recently. He was due to leave for India. He said that since the end of the war India had become more of a consumer than a producer of rubber. 'This means that we can expect Indian demand for rubber to increase as the country's industrial plan progresses. We hope that in buying rubber from foreign countries India will buy more Malayan rubber in future,' he added.

●**Thailand**—Officials of the Thailand Government and a Brazilian mission have agreed to promote two-way trade between the two countries, Mr Luang Thawil Sethapanichkarn, Thailand Economic Affairs Under-Secretary, said on April 17. Among items he said Brazil was willing to purchase is Thai rubber.

●**Canada**—Mr F. J. Ainsborough, of Toronto, has been appointed mediator in the month-old pay and conditions dispute between the Crown-owned Polymer Corporation and about 1,800 employees at the Sarnia, Ontario, synthetic rubber plant. The men are members of the Oil, Chemical and Atomic Workers' Union.

●**United States** — Representatives of the US Rubber Co. and United Rubber Workers' Union have met again with both sides reporting no progress towards the settlement of the fortnight-old strike, affecting approximately 25,000 US Rubber Co. workers in 18 plants throughout the US.

●**China**—Mainland China has concluded a contract to buy 4,700 tons of Indonesian rubber, it is announced. International Rubber Study Group statistics show that last year China bought 79,250 tons of rubber from Indonesia compared with 35,852 tons in 1957.

'Let's give 'em a real sales boost—let's give away a free cornflake with every plastic toy!'—436

SP Brown Crepe

COMMERCIAL PRODUCTION OF NEW LOWER GRADE

By H. C. BAKER (BRPRA)

SUPERIOR processing (SP) natural rubber is now a well-known raw material of the rubber manufacturing industry[1,2,3,4]. First introduced as SP crepe the material found limited acceptance, *e.g.* for high grade extrusions of complicated sections. With the later introduction of SP sheet grades, SP smoked sheet and SP air dried sheet, and notably the former, the usage of SP rubber increased considerably so that current consumption of SP rubbers has reached 2,000 tons per annum, in less than two years. With the introduction, now announced, of SP brown crepe the addition of an SP lower grade of natural rubber is expected to widen still further the field of usage for SP rubbers in more competitive applications.

Normal Handling

Hitherto all SP rubbers have been prepared on Malayan estates as first quality rubbers. Vulcanized latex and field latex are blended in controlled proportions and coagulated. The resulting coagulum can be handled in the normal way and is processed either as sheet or crepe. In the resulting SP sheet or SP crepe the vulcanized particles are intimately dispersed as individual particles which retain their identity throughout manufacturing processes to the final article, where they can be photographed and identified by electron microscopy and also by optical methods.

As a result of much development work the Rubber Research Institute of Malaya has now described a process for the production of SP brown crepe on a commercial scale [5]. Since the brown crepe grades are made from various kinds of wet scrap rubber at the estate factory or in a remilling factory, the process for making first quality SP sheet or crepe from latex blends is inapplicable. In the process actually adopted the wet scrap is blended on power wash mills with a concentrated SP masterbatch in the form of a wet crumb, in controlled proportions to impart the desired degree of SP properties. The resulting blend of SP rubber is milled to a thin crepe, made into 224lb. bales with an outer wrapping of the same SP brown crepe, and secured with steel bands.

SP brown crepe processes the same ratio (20/80) of vulcanized to unvulcanized component as in SP first quality sheet and crepe. Whether produced on an estate or at a remilling factory it will always be cleaner and generally lighter in colour than 2X thin brown crepe or the equivalent thin remilled crepe. Thus experimental batches of SP brown crepe prepared from wet scrap at a remilling factory contained about half the amount of foreign material (less than 1 part per 1,000) retained on a 325 mesh screen in laboratory determinations than ordinary brown crepe prepared from the same scrap.

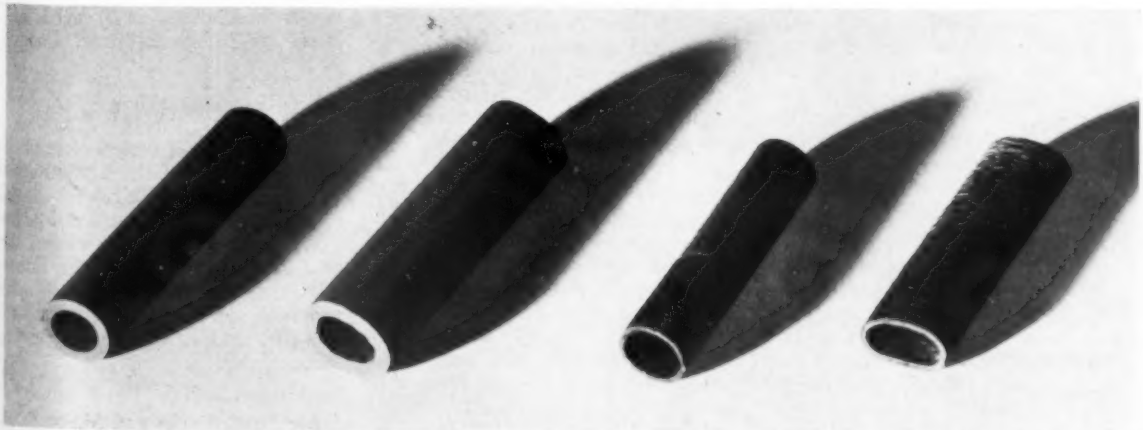
All SP rubbers are prepared by patented methods under licence from the Rubber Research Institute of Malaya. Every batch is checked for uniformity of SP properties before it is shipped. For example, all batches of SP rubbers have to pass a test for extrusion swell in a tyre-tread compound, demonstrating incidentally, that SP rubbers retain their distinctive properties in the presence of substantial loadings of fillers. The extrusion swell of SP brown crepe in this test is about half that of ordinary brown crepe. In addition chemical tests ensure that the correct degree of vulcanization has been attained.

The distinctive characteristics of SP rubbers derive from their two-phase nature. These have been summarized, together with the resulting consequences of benefit to manufacturers in BRPRA Technical Bulletin No. 2.

Smooth Extrusions

SP brown crepe possesses all the SP characteristics normally associated with first quality SP rubbers. Outstanding among these is the ability to give smooth extrusions in stocks of high rubber content where a processing aid would normally be required, and where in consequence compound formulae can be simplified and vulcanizate properties improved. Coupled with the ability to confer smoothness is the greatly reduced die swell of extrusions leading to greater output with more accurate conformity to die dimensions.

Other valuable consequences of the



Comparison between extrusions of ordinary crepe and SP brown crepe. Note the smooth surface and circular section of the SP extrusions which, from left to right, are first and third in the illustration

two phase nature of SP rubbers are its effects on Mooney viscosity and associated properties, rendering SP rubbers less 'nervy' and easier to handle than the corresponding ordinary grades. Thus SP brown crepe quickly bands to a smooth sheet on the mill and readily accepts fillers in the internal mixer. Compounds prepared by either means are of generally higher Mooney viscosity and resist further breakdown to a greater extent than similar compounds based on ordinary brown crepe. This is of particular value in compounds of low hardness in preventing undue flow in storage, and in allowing full utilization of factory unvulcanized scrap without undue degradation of compounds on reworking.

In common with other SP rubbers SP brown crepe has a somewhat shorter scorch time and faster curing rate than ordinary brown crepe from the same source. Together with the higher compound viscosity these factors contribute to the improved resistance to collapse of extruded sections in unsupported vulcanization and reduction of water marking in open steam cures.

Where scorching risks are appreciable, however, the extra tendency of SP rubbers to scorch may be taken care of by adjustment of accelerator dosage, *e.g.* the minor component of a dual accelerator system or by the use of a retarder. It is also sometimes possible to reduce the scorch risk by the simplification of the compound which the use of SP rubber often allows.

Amplification of the above description of the advantages conferred by SP rubbers is given by Tables I and II and Fig. 1. Table I and Fig. 1 show the advantages of SP brown crepe over ordinary brown crepe in a pure gum stock and in a soft red tubing stock.

TABLE 1

COMPOSITION

Pure gum compound: Rubber 100, zinc oxide 6, stearic acid 1, sulphur 1.5, lampblack 1, phenyl-β-naphthylamine 1, mercaptobenzthiazole 1.25. Ingredients reduced by 20% for SP brown crepe.

Soft red tubing compound (figures in brackets for SP rubber): Rubber 100, zinc oxide 7 (5), activated whiting 20, Vaseline 5, red oxide 5, stearic acid 1 (0.8), MBTS 1.4 (1.1), TMT 0.175 (0.14), sulphur 1.6 (1.3), Nonox EXN 1.

Compound Brown crepe	*Pure gum* SP	*Pure gum* Ordinary	*Soft red tubing* SP	*Soft red tubing* Ordinary
Compound Mooney viscosity	55	54	38	27
Mooney scorch time (min.)	5	7	16	18.5
Die swell (%)	68	110	48	131

Die dimensions: Pure gum $\frac{5}{16}$in. o.d., $\frac{1}{4}$in. i.d.; soft red tubing $\frac{3}{8}$in. o.d., $\frac{1}{4}$in. i.d.
Extruder speed: 40 rpm.
Temperatures: Barrel 65°C., head 80°C., die 95°C.

SP brown crepe can give improved processing and better physical properties in many commercial compounds. This is shown in Table 2 for three weatherstrip-type compounds with MBTS/TMT acceleration, A, B, C.

A. *Hardness* 55-60°*BS*. *Good quality*. SG 1.2.
Principal fillers: 30 china clay, 15 lampblack.

B. *Hardness* 65-70°*BS*. *Good quality*. SG 1.35.
Principal fillers: 30 china clay, 30 ground whiting, 15 zinc oxide, 10 magnesium carbonate, 10 FEF black.

C. *Hardness* 65-70°*BS*. *Medium quality*. SG 1.45.
Principal fillers: 60 china clay, 60 ground whiting, 10 magnesium carbonate, 10 FEF black.

TABLE 2

Rubber Compound type	*SP grade* A	A	B	C	*Ordinary grades* A	B	C
Composition:							
SP brown crepe	50	100	100	50			
SP RSS	50			50			
Brown crepe					100	50	50
RSS 3						50	50
Factice	20				40		20
Processing:							
Extrusion swell (%)	11.5	11	17.5	7.5	22	41	16
Mooney scorch time (min.) ..	8	9¼	6	6¾	5½	7¾	6¼
Physical properties:							
Tensile strength (kg./cm.²) ..	158	200	159	117	125	170	102
(psi) ..	2,250	2,850	2,250	1,650	1,780	2,420	1,450
Aged ditto (kg./cm.²)	86	160	104	95	50	107	64
(psi)	1,225	2,280	1,480	1,350	720	1,520	910
Elongation at break (%) ..	550	570	530	465	530	510	445
Aged ditto (%)	330	450	375	395	200	350	260
Compression set (%) ..	5.1	6.6	5.8	8.5	5.3	5.4	7.7
Hardness (°BS)	56	61	69	67	54	69	67
Compression set at 25% strain.	Ageing 14 days in air at 70°C.						

Technical data concerning SP Brown Crepe are given in Additional Information Sheet B published by the NRDB for the British Rubber Producers' Research Association. For trial purposes, laboratory samples and/or 224lb. bales of SP Brown Crepe are available from BRPRA, 48-56 Tewin Road, Welwyn Garden City, Herts.

REFERENCES

[1] H. C. Baker, *Trans. IRI*, 1956, **32**, 77.
[2] H. C. Baker, *Rubber Developments*, 1955, **8**, 70; 1957, **10**, 127.
[3] W. P. Fletcher and H. C. Baker, BRPRA Technical Bulletin No. 2, 'SP Rubber.'
[4] B.P. 803,013.
[5] B. C. Sekhar and G. W. Drake, *J. Rubb. Res. Inst. Malaya*, 1958, **15**, 216.

Vertilex Wall Covering

Vertilex, a flexible vinyl wall covering, which can be moulded to fit round pipes or corners, has been developed by Semtex Ltd., for use wherever minimum maintenance and maximum hygiene are essential. The wall coverings are made in a thin gauge vinyl material in units measuring 6in. x 6in., 12in. x 12in., 12in. x 6in., and 12in. x 4in. They are resistant to grease, fats, oil and most of the chemicals and alkalis which are in everyday use. Particularly close jointing of the units lessens the likelihood of germ traps, and makes Vertilex suitable for laboratories, hospitals, schools, office blocks or public buildings, as well as in the home. Nine colours are available: Charcoal, oyster black, mist, walnut, salmon pink, lemon, geranium, cordova blue and jade green. The units are gloss finished. Prices can be obtained from any Semtex depot or from Semtex House, 19-20 Berners Street, London, W.1.

Reichhold Changes

Donald G. Patterson has been named manager of the newly-formed Plastics Division of Reichhold Chemicals Inc., it was announced in New York last week. At the same time, RCI also named William F. Turner sales manager and Charles S. Stryker technical service manager of the Polyester and Epoxy Resins Department.

Mr D. C. Banks and Major D. A. Blair have been appointed directors of the Distillers Co.

What are we Talking About?

AN ESSAY IN FLEXIBILITY AND RIGIDITY

By F. C. JENNINGS*

SINCE Fisher first proposed it in 1939, the word 'elastomer' has crept into use and usefulness among rubber technologists but regrettably is not common among other people in the rubber industry and is scarcely known to the general public. It is the basis of a valuable distinction in the field of polymers and not more so than at the present time when many people are reluctant to accept the proposition that 'rubber' is any material having rubberlike properties.

The apparent tautology in this proposition arises from its epigrammatic intent and is not real because what is meant is: let us, in view of current trends, call anything 'rubber' which has the property of high elasticity. Even the dissenters acknowledge that GR-S (or is it 'SBR'?) is appropriately called 'rubber' although it differs in composition from natural rubber and thus they have yielded the whole basis of their defence to the logician.

Or have they merely pushed out their defences a little further? Can they, do they refuse to call neoprene a 'rubber,' or the butadiene-acrylonitriles, or, for that matter, polybutadiene? Some do: some do not, no doubt.

Polyurethane Foam

And where next? Is Adiprene a rubber? Is the isocyanate-cross-linked polyester, 'Vulkollan,' a rubber? It is used as if it were and has indeed come under serious investigation as a tyre tread. In the related field of polyurethane foam, the technical committee of the Plastics Foam Manufacturers' Association had defined the materials it deals with as 'Isocyanate Rubber Foams' on the ground that 'urethane' is neither an adequate nor a unique description, because while they do contain urethane linkages they contain others as well. It is true, too, that the latest of such foams, based on polyethers, have fooled even latex foam rubber experts into believing that they were feeling a cushion made of 'real rubber foam.'

Has the time come to take the bull by the horns? He is at the moment dashing about a pretty china shop. It will not have escaped the observant that the technical committee referred to belongs to an association of plastics manufacturers but it is not a secret that that association is a member of the Federation of British Rubber and Allied Manufacturers.

Who is to have the honour of taking this bull by the horns? Of course, no one will, at least until everybody does. Someone may be intrepid enough to show the way, that is all that can be hoped. The British Standards Institution, from its vantage point on a fence it has constructed and called 'PLC/RUC' (*i.e.*, half plastic and half rubber), is well placed to join in when the crowd starts moving.

Something in Common

The point is that you can get to the Marble Arch up Park Lane or along Oxford Street, which means that both have something in common and the relationship can be shown on a suitable plan.

Fisher, in 1939, drew a rough plan, others have filled in details from time to time, but so much building has been going on in the last twenty years that we need a new one. A chart of this small area could be adapted from the splendid map published under the title 'Report on Nomenclature in the Field of Macromolecules,' published in the *Journal of Polymer Science*, Vol. VIII, No. 3, pages 257-277, and adopted in 1951 by the International Union of Pure and Applied Chemistry.

There it is pointed out that the term 'plastics' is an anomalous one since they are not always 'plastic.' Further, it uses the terms 'elastomer' and 'rubber' as synonymous, defining them as 'a macromolecular material exhibiting long-range elasticity. . . .' We need go no further.

It is possible now to define in modern terms some of the well-known phenomena of the rubber industry (*e.g.* 'vulcanization') because the molecular mechanism is now understood more closely. The sort of words being used are 'polymer,' of which there are a number of well-recognized types such as 'linear polymers,' 'copolymers,' 'homopolymers,' all being based on the conception that they are large molecules consisting of repeating multiples of a small molecular unit, the 'monomer.'

From the point of view of the rubber industry, its basic raw materials, 'rubber,' are generally long-chain polymers which are 'cross-linked' in the process of vulcanization, generally but not always by means of sulphur.

From the point of view of the plastics industry, its basic raw materials are also polymers which may be converted into manufactured articles without cross-linking, *e.g.*, cellulose acetate or polythene, or may be cross-linked by a process akin to vulcanization to form a rigid, thermoset article.

There is a sense, therefore, in which the two industries are sectors of one comprehensive industry, the high polymer industry, whose basic raw materials are thermoplastic and whose finished products are either thermoplastic or elastic or thermoset or even partly one and partly another. Rubber, it should be remembered, can be converted into a thermoset material—ebonite; PVC, on the other hand, can be converted into a rubbery material. And whichever industry carries out such conversions depends on whether they are going up Park Lane or along Oxford Street.

A Battle of Words

It is all a pretty battle of words, but people will die for words and it is more satisfying to die for meaningful words. Battles are fought mainly because the territory occupied is thought to be insecurely held. 'Plastics' is not a good term for many of the materials made by the plastics industry; and if we are to be purist, 'rubber' is not a good term for most of the articles made by the rubber industry because the properties of prime interest do not include that of rubbing-off pencil marks from paper. Yet so securely imbedded are they both in English usage and history that the battle can go on without anyone fearing he may lose.

Accepting this, perhaps there is a way round. Beginning with the proposition that 'elastomer,' good as it is and useful to the technologist, is not generally acceptable, we must prefer its synonym 'rubber.' If we accept this for the moment, does it not imply that we would be well advised to treat 'plastomer' in the

* *Manager, Cushioning Development Laboratory, Dunlop Rubber Co. Ltd., Liverpool.*

same way and accept 'plastic'? Then a 'rigid plastic' is not as nonsensical as a 'rigid rubber' would be.

Perhaps we can now see our way clearer. There are three main classes of materials concerned.

Rubbers,

Thermoplastic plastics,

Thermoset plastics,

and we can regard it as the function of the rubber industry to deal with rubbers, and of the plastics industry to deal with the other two.

Is that any different from the present position? Yes, it is: chiefly because is recognizes that all rubbery materials are properly called 'rubbers.' Preface that noun, if you wish, with an adjective such as 'synthetic' or 'acrylonitrile' or 'isocyanate,' or even 'urethane,' and, further, let it be understood that some of them are called 'rubber' before cross-linking or vulcanization gives them true or predominating elasticity.

Elasticity

Doubtless, some definition must be given of the term 'elasticity' as applied to rubbers. The essential concept is that when elastic material is deformed by stretching, compressing, shearing, torsioning, it returns to its original shape and size when the deforming force is removed. Only two qualifications of this are needed to fit it for rubbers: the deformation must be large (steel is 'elastic'), and the return must be quick, at the most a matter of minutes not next week.

Here are some definitions based on the foregoing thoughts.

'Rubber': a material which exhibits rapid recovery from a large deformation. In appropriate contexts, the largely-plastic raw material from which the cross-linked elastic rubber is made is also called a 'rubber.'

Thermoplast: a material whose plasticity is much greater than its elasticity at normal temperatures and becomes greater as its temperature is raised.

Thermoset: a material which has been converted from a predominantly plastic to a predominantly rigid state, generally by condensation cross-linking but sometimes, as with ebonite, by other types of cross-linking reaction.

Plastic: as a noun, the word indicates either a thermoplast or a thermoset.

It will be observed that these definitions are based on the physical rather than the chemical properties of the materials.

Hungarian Rubber and Plastics

A HUNGARIAN concern, Vegyterv, is at present designing seven plastics manufacturing plants for the Soviet Union, and a considerable part of the machinery for these plants is to be produced by Hungarian industry, according to the February issue of the 'Hungarian Exporter.' Reports are also given in this publication of the progress and products of other rubber and plastics manufacturing companies.

Hungaria Muanyagesgumiarugyar is having considerable success in the building trade with drain and pressure pipes made from PVC, and one of its most recent products is a smart polythene bottle and drinking cup which is on the market in a plastic pack. This company makes gears from aminocaprolactam by injection moulding and these are found suitable for and are being used extensively in the textile and wood working industries. A foam material, 'Sztirocell' is shortly to be put into production by the company, which is to use a process developed by the Budapest Research Institute for Plastics. It is interesting to note that a 2.5cm. wall of this new insulating material gives better results than a 50cm. thick brick wall.

Several new articles and goods of improved quality and make are being put on the market by the Hungaria Works. Inflatable rubber toys are very popular and the company has recently received an order for 12,000 pieces for export to Western Europe. Palma Gumigyar is having considerable success with its inflatable rubber mattresses.

The 'Hungarian Exporter' report concludes by reporting on research work. This is continuing and steady development of works producing and processing basic materials supplies a solid basis for further development of Hungarian plastic and rubber output.

Plastics Production Up

STATEMENT AT BPF LUNCHEON

IN his speech at the Silver Jubilee luncheon of the British Plastics Federation, held on April 22, Mr N. B. Punfield, chairman of the Federation, said that it seemed certain that the plastics industry could expect a continued rapid growth for at least the next decade. He quoted production and export figures for plastics materials and said that it was now clear that plastics were an important exporting industry. It was satisfactory to note, he added, that the industry was rapidly reaching self sufficiency in the production of plastics materials.

A report of the luncheon will appear in next week's issue of *RJIP*.

A representative selection of plastics mouldings, ranging from complete radio receiver cabinets to terminal blocks and coil formers, was shown on the stand of Ekco Plastics Ltd. at the 1959 Radio and Electronic Component Manufacturers' Federation Exhibition. The exhibition was held at Grosvenor House, Park Lane, from April 6-9

How to finish in the money

One way to assure your product of a profitable finish is to start with a size based on CHEMIGUM LATEX.

CHEMIGUM LATEX is a colloidal dispersion of a butadiene-acrylonitrile copolymer having excellent acid-salt tolerance and mechanical stability. It is easily compounded and readily applied at room temperature on conventional slashing or padding equipment.

The end result of using CHEMIGUM LATEX is a permanent finish which exhibits unusual abrasion- and crock-resistance, a pleasant hand, dimensional stability and colour fastness. Such a finish also compensates for the adverse effects of other treatments.

Details on how CHEMIGUM LATEX can give you money-making finishes or improve warp-sizes, backings, binders, inks or adhesives are yours for the asking. Just contact your nearest Goodyear Chemical Distributor.

CHEMICAL
GOODYEAR
DIVISION

Distributed in the United Kingdom by:
HUBRON SALES LTD., FAILSWORTH, MANCHESTER
TEL: FAILSWORTH 2691
Other Distributors in all Western European Countries

Goodyear International Corporation, Chemical Division, Akron 16, Ohio, U.S.A. The Goodyear Tyre & Rubber Company (Great Britain) Ltd., 17 Stratton Street, London W1, England

Chemigum, Plioflex, Pliolite, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio, U.S.A.

CHEMIGUM • PLIOFLEX • PLIOLITE • PLIOVIC • WING-CHEMICALS
High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries

Material Developments

AT THE PLASTICS EXHIBITION

A PAPER on 'Some New Amine Hardened Epoxide Resin Systems and their Properties,' will be given at the International Plastics Exhibition Convention by R. N. Lewis, Bakelite Ltd., Birmingham. Liquid epoxide resins, with their various hardening agents, offer a unique combination of properties. There are, however, considerable handling difficulties associated with both the resins themselves and the ancillary materials used to harden them. The paper discusses developments which have been made to overcome some of these difficulties, particularly those associated with amine hardeners.

Methods of modifying aliphatic amines to improve their characteristics when used as epoxide resin hardeners are considered. After referring to modifications with ethylene oxide to give the so-called 'minimum irritation potential' hardeners, the paper considers modifications to give hardeners of controlled reactivity.

Such controlled reactivity hardeners are obtained by modifying aliphatic amines with acrylonitrile, but hitherto this has entailed an appreciable sacrifice in physical properties of the cured epoxide resin. Some new hardeners are described which permit control over curing rates with considerably less sacrifice in physical properties than occurred with earlier modified amines.

Another new development discussed is the production of a new type of flexibilizer for epoxide resins with improved handling characteristics compared with those available hitherto. Such flexibilizers have excellent compatibility with amine hardeners and can have very low viscosities. Their physical properties and those they impart to epoxide resins are discussed and compared with the well-known polyamide and polysulphide flexibilizers.

Block and Graft Copolymers

'Some Theoretical and Practical Aspects of Block and Graft Copolymer Syntheses' will be discussed by J. Benton, Distillers Co. Ltd., and C. M. Thomas, British Geon Ltd., Barry, S. Wales. In Part 1 a general survey is made of block and graft copolymers which are broadly classified according to type and method of preparation. Factors governing the practical development of ordered copolymers are discussed. Successful applications are few and tend to be restricted to narrow specialized fields. This is attributed primarily to limitations of methods of preparation most of which lead to the formation of a copolymer - homopolymer mixture. There are signs that feasible developments are taking place in the natural and synthetic rubber fields, but a large scale exploitation of these new copolymers is likely to be slow within the existing framework of low-cost monomers.

This homopolymer is then heated to a higher temperature in Monomer B to promote initiation by Y Y and obtain a block copolymer of the type Ap R Br.

Experimental results are described where X is a hydroperoxide group and Y Y a peroxide group and A and B are methyl methacrylate and styrene. The practical aspects and limitations of this system are discussed. Proof of block copolymer formation was confirmed by turbidimetric titration and other solubility methods.

In part 2 an equation is readily derived for the normal free radical chain mechanism of polymerization which relates the degree of polymerization of the product polymer to the kinetic constants and reactant concentrations for any monomer-solvent-initiator combination. The terms of this equation can be related to the proportion of polymer molecules whose chain ends arise by mutual termination and by the various transfer reactions. From the published kinetic data for vinyl polymerizations, it becomes possible to make some quantitative predictions of the feasibility of, and optimum conditions for, the synthesis of block copolymers of high purity employing selected techniques. A particular technique, employing a multifunctional initiator molecule, e.g., X R Y Y R X, is considered in detail.

The use of multifunctional initiators is not new in the field of block polymer synthesis. However, previous methods have used molecules where the initiating functions X, Y are identical, e.g., X R X. Such methods are unspecific and generally yield mixtures of block copolymer and homopolymer. The novel feature of the present method rests on the use of the groups, X, Y Y whose powers to initiate polymerization chains lie in ranges of temperature separated by at least 50°C. Hence it is possible to employ X R Y Y R X as initiator in Monomer A at a low temperature so that only the X groups are activated and to obtain a homopolymer molecule Ap R Y Y R Aq in which the initiator group Y Y remains intact.

I.C.I. to Manufacture Polypropylene

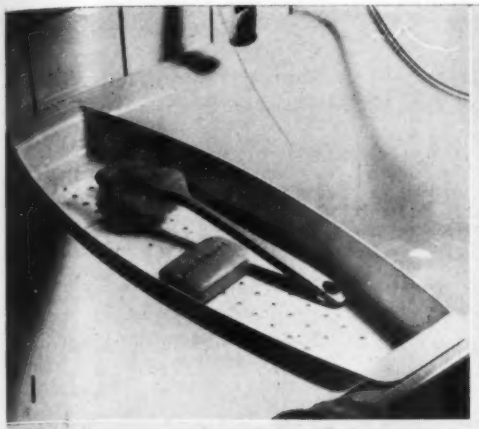
An agreement has been signed whereby I.C.I. acquires a licence under the Montecatini and Montecatini/Ziegler UK patents covering the production and use of polypropylene. It will be marketed under the trade name 'Propathene.'

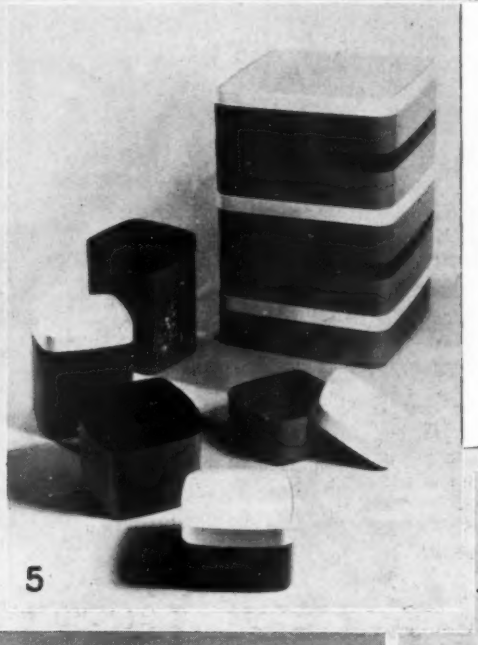
A new plant is being constructed at Wilton Works, North Yorkshire, which will bring I.C.I.'s total polyolefines capacity for 'Alkathene' and 'Propathene' to over 100,000 tons a year.

'Propathene' is at present being manufactured at a pilot plant, and arrangements have been made to augment this pilot plant production so that the material will be available in substantial commercial quantities from June 1.

Montecatini has announced this week that arrangements have been completed for the licensing of the production and use of polypropylene plastics in the UK under Montecatini and Montecatini-Ziegler patents by another company, the Shell Chemical Co.

Evo-Stik impact adhesive manufactured by Evode Ltd., Common Road, Stafford, is being used to fix modern plastic coverings, such as Vynide, Texturide and Arlinghide, to the walls and ceilings of Armstrong Whitworth's new aircraft, the Argosy. The Argosy is expected to be in commercial use by mid-1960 for freight, passenger and military purposes





Plastics Exhibition

DESIGN DISPLAY

One of the special features of the International Plastics Exhibition at Olympia, June 17-27, will be a design display. Some 200 products will be shown, among which will be the following: 1, bath tidy (Sweden); 2, plastics dishes (Denmark); 3, electric razor (West German Republic); 4, dustbin (USA); 5, canisters (Sweden); 6, salt and pepper shakers (USA); 7, minute timer (USA); 8, chair (USA)

The Industry in Turkey

SCOPE FOR EXPANSION

FOR some time, it is reported from Istanbul, the rubber manufacturing industry in Turkey, mostly concentrated into the production of footwear and associated articles, has found the supply of natural rubber difficult due to the financial policy of the Government. For two years, imports of chemicals and raw rubber have been restricted and allocations have been made to factories according to their production capacities. During the shortage, rubber reclaimers entered the market with a reclaim processed from unselected cheap waste and lacking minimum physical properties. Large amounts of this inferior reclaim were absorbed by the industry, up to 20 tons daily at times, and the 'short term' reclaimers made substantial profits. Foreign exchange relaxations have recently come into force, however, and natural rubber is more readily available. The reclaimers have virtually gone out of business.

A surprisingly high proportion of the rubber used in Turkey is synthetic, 4-500 tons, compared with 2,000 tons of natural, annually. This synthetic, almost entirely used for the manufacture of soles and heels, is imported from Germany, but small quantities of neoprene and Polysar krylene are also imported.

Fifteen years ago, Turkey's rubber industry was practically non-existent, and it headway since that time has been slow. Few rubber technologists are available and the majority of factories (there are approximately 300 in Turkey, 200 of which are in Istanbul) rely on formulations supplied by chemical companies. It is easy to understand that under these circumstances, the quality of goods is not, by and large, of the best. Important ingredients are missing and are substantially replaced with inorganic fillers. Also, the industry is operating with machinery which, in general, falls somewhat short of modern standards.

Turkey is a country rich in mineral resources and it has many new industries, all of which are rapidly expanding. With this expansion has grown a ready market for a large variety of rubber products ranging from small synthetic gaskets to giant conveyor belts and tyres. There is also an extensive potential market for consumer goods, and with the assistance which local sources expect from the Turkish Government shortly, opportunities for the future will be exceptional. At least one British company has taken steps to be in on this bright future. The Turkish Government recently announced that it had approved a proposal by Dunlop for the construction of a tyre factory at Izmit. The factory is to start activity in 18 months' time and will produce 250,000 tyres, of which 50,000 will be for tractors and the rest for cars and trucks.

The plastics industry in Turkey is on a better footing at the present time. Up-to-date German equipment and technical knowledge are used and production is mostly of domestic commodities—upholstery, tablecloths, and coated fabrics, etc., up to 100 grams per unit. A large section of the industry is devoted to the manufacture of plastics soles for peasants' shoes, and Turkey's latest plant produces packaging material from polythene and polystyrene. The injection moulding system is that most widely used, but other methods are in operation. Demand for plastics is increasing rapidly and the present scale of operations is not sufficient to cope for the market.

Rubber and Plastics in South Africa

NEWS OF FIRMS AND PRODUCTS

ON June 30 1949 a Goodyear Canadian stacker belt was installed at the Stork Shaft of the Roan Antelope copper mine in Northern Rhodesia, and it continued to convey ore until August 1958. During that period it carried a total of 45,125,600 tons. Another stacker conveyor belt installed by the Goodyear organization in South Africa at this mine has carried 37,559,000 tons. This belt was installed in December 1948 and taken out of service at the end of 1956.

Industrial Tapes

A company in Pinetown, near Durban, is now manufacturing a variety of industrial adhesive tapes of which pressure sensitive adhesive tape, made on a base of plasticized polyvinylchloride, is stated to be the most important. In addition, the firm produces a tape which is made especially for wrapping around pipes to prevent corrosion and the most effective manner of applying this tape is by means of a wrapping machine which is light and simple to operate. Another product is an adhesive plastic tape printed with broad diagonal stripes in black and yellow. It is intended for marking the danger points in factories, workshops, etc. The tape is easy to apply and it can be removed with the same ease.

PVC Cloth

James North (Africa) (Pty.) Ltd., New Germany, Pinetown, Natal, which has been in operation since August 1957, is producing increasing quantities of PVC cloth for processing into industrial protective clothing. It is now manufacturing a range of 24 different types of protective gloves at a rate of a thousand pairs a day.

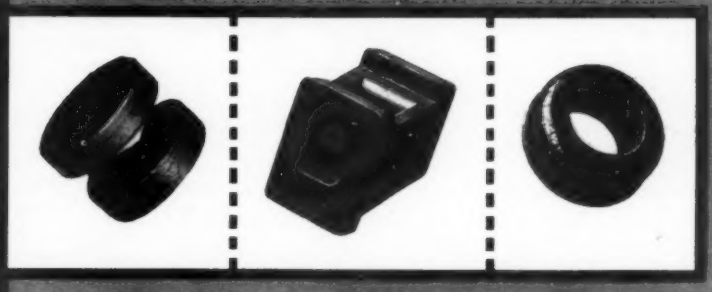
Comprehensive Range

Although it is less than two years since Pretoria Industrial Plastics (Pty.) Ltd. Pretoria, moved into their present factory, the demand for the wide range of items made by this company has developed so much that the buildings are being extended to provide an additional 16,000 sq. ft. of floor space. This firm holds the sole South African licence for the new packaging material Netlon, which is expected to enjoy a very strong demand in South Africa. The company is also making plastic bristles for the brushware industry in PVC, polythene, styrene and nylon in all the colours and dimensions needed. For the household trade, flower pots, buckets and cups and saucers are made, together with many other domestic needs. This company is one of the subsidiaries of the Anglo-Transvaal Industries group, 71 Fox Street, Johannesburg.

Plastic containers, tumblers, bowls and other domestic and industrial items are made by Anlo Plastics, Bolton Street, Benoni, Transvaal.

South African Bonded Fibreglass, P.O. Box 2690, Cape Town, are undertaking the production of skis and surfboards of laminated plywood with a plastic varnish finish. The manufacturers claim that these skis will never crack or warp. They were introduced for the first time on the South African market in the past summer season and sold so well that in the coming season a very much extended sale is expected.

De-flash small rubber parts with 'DRIKOLD' in the Columbian International Sub-zero Tumbler



By freezing small rubber components with 'Drikold' —I.C.I. solid carbon dioxide—in a rotating drum, flashes become brittle and break off with the tumbling action.

Sub-zero deflashing with 'Drikold' can
cut your costs
speed your processes
increase your production.

I.C.I. Technical Service Staff will advise on your problems, and will de-flash sample batches of your components on request.

Sub-zero tumblers are obtainable from Columbian International (Great Britain) Ltd., 116 Cannon Street, London, E.C.4.

ICI

IMPERIAL CHEMICAL INDUSTRIES LTD.
LONDON SW1

DK.301

VIEWS and REVIEWS

Symposium on Fluorine Chemistry

SPONSORED jointly by the Chemical Society and the University of Birmingham, an International Symposium on *Fluorine Chemistry* is to be held in the University of Birmingham over the period July 14 to July 17. The list of papers covered by the provisional programme (some 40 to 50, many of great interest in view of the fast-growing importance of the subject both from a scientific and from the industrial point of view), and the eminence of the authors mentioned, should make this symposium a more than ordinary attraction.

The Conference will be opened by Professor Stacey, and introduced by the President of the Chemical Society.

Readers of Papers

With regard to the provisional programme of papers, a few words by way of exemplification and not by selection should be of interest. Thus we have communications from official organizations such as that from Dr J. F. Ellis of the UK Atomic Energy Authority (Capenhurst) on 'Non-destructive Quantitative Analysis of Volatile Fluorides,' and from Dr G. T. Armstrong (National Bureau of Standards, USA) on the 'Determination of Heats of Formation of Inorganic Fluorides.'

Universities represented include Cornell; Münster; Manchester; London; Durham; Birmingham; Cambridge; Edinburgh; Sheffield; and Southampton; and one from the Technische Hochschule, Munich.

Amongst the leading industrial organizations represented we find Du Pont; I.C.I.; Monsanto; Albright and Wilson; Stauffer Chemical Co.; Dow Chemical of Canada, and Imperial Smelting Corporation.

General Arrangements

Regarding such matters as registration, fees, accommodation, etc., enquiries should be addressed to The General Secretary, The Chemical Society, Burlington House, London, W.1.

Water-Thinnable Coatings

In *Industrial and Engineering Chemistry* (1959, 51, No. 2; pp. 113 to 118) are published a series of five brief articles, based on papers presented at the 133rd American Chemical Society meeting held at San Francisco, on 'Water-Thinnable Coatings.'

In his Introduction, Herbert Terry (Shawinigan Resins, Springfield, Mass)* says 'These articles offer a significant cross section of basic research being carried on in the field of water-thinnable coatings.'

Differences from 'Solvent' Systems

Mr Terry's remarks as to differentiating between coatings based on water-thinned vehicles (a) and those depending on (b) organic solvent-thinned systems, are timely, and, as it seems to me, definitely valuable. Work by analogy as on coatings based on (a) may have little value if judged by coatings depending on (b); or, as Mr Terry puts it: '. . . the value of attempts to operate by analogy from' (b) 'has diminished rather rapidly.'

The writer of the introductory note (Mr Terry) concludes:

'In short, the necessity for a distinctive approach to water-thinnable coatings exists. The condensations* which follow reflect clearly the influence of such an approach.'

Emulsifier-Free Water-Thinnable Paints

The first of the abstracts based on the 'Water-Thinnable Coatings' symposium (*cf. introductory remarks in previous note*) relates to: 'Formulation of Water-Thinnable Paints from Emulsifier-Free Vinyl Acetate Copolymer Dispersions' (*loc. cit., I/EC, supra,* 114). The authors are W. F. Scheufele and N. G. Tompkins (Dewey and Almy Divisions, W. R. Grace and Co., Cambridge, Mass.).

It appears that 'All water-thinnable paints yield films containing appreciable amounts of water soluble, extractable material, which give them a tendency to water-spot excessively' and to show other poor behaviour under wet conditions. After referring to the literature (*cf. refs.*), some experiments on three white paints are described, one an emsulsifier-free vinyl acetate copolymer emulsion, and one 'from each of two otherwise similar conventional materials. . . .' Scrubability was determined in this series, and as a result it is stated (*ref. being made to a 'figure'*) that: 'It is evident that the emulsifier-free product gives superior performance where, as in interior painting, exposure to water is likely to be of relatively short duration.'

The concluding paragraph of this publication reads:

'It appears that emulsifier-free vinyl acetate copolymer emulsions represent a promising approach where the application of conventional emulsions of this type are limited by the high rate of water absorption of their films. Many such uses exist in the paint, paper, leather, and woven and non-woven textile fields.'

Acrylic Emulsions

The second of the abstracts of the Water Thinnable Coatings symposium is by D. B. Fordyce, Jean Dupré and Walter Toy (Rohm and Haas Co., Philadelphia) and deals with 'Alkali-Soluble Acrylic Emulsions' (*loc. cit.*, I/EC, 115).

These copolymer emulsions of methacrylic acid (MMA) with lower acrylate and methacrylate esters prepared by emulsion polymerization techniques, have the advantages over the usual acrylic water-soluble salts (prepared as solutions) of high solids content, low viscosity, ease of dilution, and solubilization by a variety of bases. Methods of preparation, properties, and cross-linking with polyfunctional monomers are discussed, and it is mentioned that linear polymers (prepared with about 25 to 50% MMA, as specified) are 'efficient latex thickeners in the salt form for many compounded and uncompounded latices.'

* The following note is covered by Mr Terry's introductory remarks: 'For the reader who is interested in the complete papers as presented at the . . . meeting . . . (*cf. above*), I & EC's editors have made arrangements for publication in full by the *Official Digest*, a publication of the Federation of Paint and Varnish Production Clubs, 21 South Broad Street, Philadelphia 7, Pa. This symposium will be published by the *Official Digest* in February, 1959.'

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **DR SCHIDROWITZ**

The section on cross-linking of the said emulsion polymers as to methods of production, properties (particularly in relation to degree of cross-linking) is especially attractive. As regards properties, for example, it is noted that the lightly cross-linked types are efficient thickeners for latex and pigment systems, and the emulsions can be used as *in situ* thickeners for latices and pigment dispersions.

Microbial Deterioration of W-T Coatings

'Microbiological Deterioration of Water-Thinnable Coatings' (the third paper in the symposium series) by R. T. Ross and S. J. Buckman (Buckman Labs., Memphis, Tenn.)—*loc. cit.*, I/EC, 116—commences by classifying this form of deterioration into two categories, namely spoilage of emulsion paints in the container and disfigurement of paint films. The former, according to the authors, is the result of metabolic degradation of resins and emulsion stabilizers (usually by bacterial rather than fungal activity), but disfigurement is the result of mould growth. The methods employed to determine the form of microbial and fungal attack, results of same, etc., are gone into; for example, one method of judging relative degree of degradation is by means of viscosity determinations, and paper *partition* chromatographic analyses of spoiled paints containing stabilizers were employed to determine the mechanism of attack.

The authors mention that it has been assumed that resins are not subject to microbial attack, but 'Although elimination of proteinaceous and carbohydrate materials would significantly reduce the nutritional value of emulsion paints, the experiments indicate that poly (vinyl acetate), styrene-butadiene and acrylic resins, are themselves subject to microbial deterioration.' I gather that stabilizers are desirable to check bacterial activity.

As regards disfigurement of emulsion paint films by growth of mould, this 'is essentially the same as that of any paint film.' I am under the impression that while this abstract is useful and indicative, the complete paper (*cf. above*) may well, from the practical point of view, as well as from the scientific angle, prove well worth studying in detail—an observation, indeed, which applies to all these interesting condensed versions of an important subject.

Levelling of Latex Paints

In 'Factors Affecting the Levelling of Latex Paints' by B. S. Garrett, W. C. Prentiss, and J. D. Scott (Rohm and Haas Co., Philadelphia) an initial point made is that the authors came to the conclusion that 'a method of evaluating levelling by other than brushing tests was necessary in order to relate one set of experiments to another' (*cf. loc. cit. I/EC*, 117). Two measurable properties were found to be available for the purpose mentioned, namely, the yield stress rate and the wicking rate, and it was concluded 'that the method outlined (*cf. section quoted*) is applicable for determining the effects of formulation variables on levelling in general, and on the specific factors controlling the levelling phenomenon, the yield stress, and wicking rate.'

Particle Size of Synthetic Latices

The last abstract based on the symposium quoted (*I/EC, as supra, 118*) relates to 'Determination of Average Particle Size of Synthetic Latices by Turbidity Measurements,' the author being A. B. Loebel (National Starch Products, Plainfield, N.J.). This highly-detailed article should be consulted in the original.

Canadian Chemical Industry

I have before me a paper on 'The Canadian Chemical Industry' with subtitle 'Export for Growth,' reprinted in Canada from *Chemistry in Canada (January and February issues*, 1959).

Attention is drawn to the fact that 'Export for Growth' was the theme of the recent meeting of the Chemical Economics Division of the Chemical Institute of Canada, and the subject is introduced by Division Chairman, Rhys Bevan, M.C.I.C., as at the Montreal meeting in November 18 1958.

The Editor of *Chemistry in Canada* particularly draws attention to the case histories (published in this reprint) of 'how companies in the chemical, synthetic rubber and agricultural implements business became successful in export markets.'

Amongst the special subjects discussed are 'International Trade Relations' by R. Latimer; 'Asia and the Middle East Markets' by W. O. Wallace; 'Chemical Exports-Commonwealth' by R. W. Blake; and 'Canada's Trade Prospects in Latin America' by A. G. Kniewasser, followed by several lots of *Questions and Answers*, and with an inset 'The Chairman Remarked,' by Leonard Hynes (Vice-President, Canadian Industries Ltd.). All the foregoing notes refer to Part I of the reprint, and Part II is also notable for interesting features. Amongst these are 'Export for Survival' by H. S. Sutherland, President, Shawinigan Chemicals Ltd., and 'Synthetic Rubber in the Export Market,' by L. D. Dougan, Vice-President of Operations, Polymer Corporation, Sarnia, which deals largely with synthetic rubber. Unfortunately, I have only space for an outline of the many interesting items in the 'Export for Growth' reprint.

Cable-Sheathing Alloys

The *March 1959* issue of the *Analyst* has published a useful paper on 'The Determination of Bismuth and Lead Cable-Sheathing Alloys' by J. H. Thompson and B. W. Peters (Materials Section, Test and Inspection Branch, Post Office Engineering Dept.). Naturally this is a communication mainly important as regards detail, but the summary should be useful for those directly interested. This summary reads:

'A modified method for the determination of small amounts of bismuth in lead and lead cable-sheathing alloys has been developed. Separation is based on extraction of the bismuth-diethyldithiocarbamate complex with chloroform, bismuth being finally determined absorptiometrically as its thiourea complex. Results are good in the range 0.002 to 0.06% of bismuth.'

Analytical Notes

The issue of the *Analyst* quoted above comes as usual with its companion publication *Analytical Abstracts* (also published for the Society for Analytical Chemistry by W. Heffer and Sons Ltd.) for March 1959.

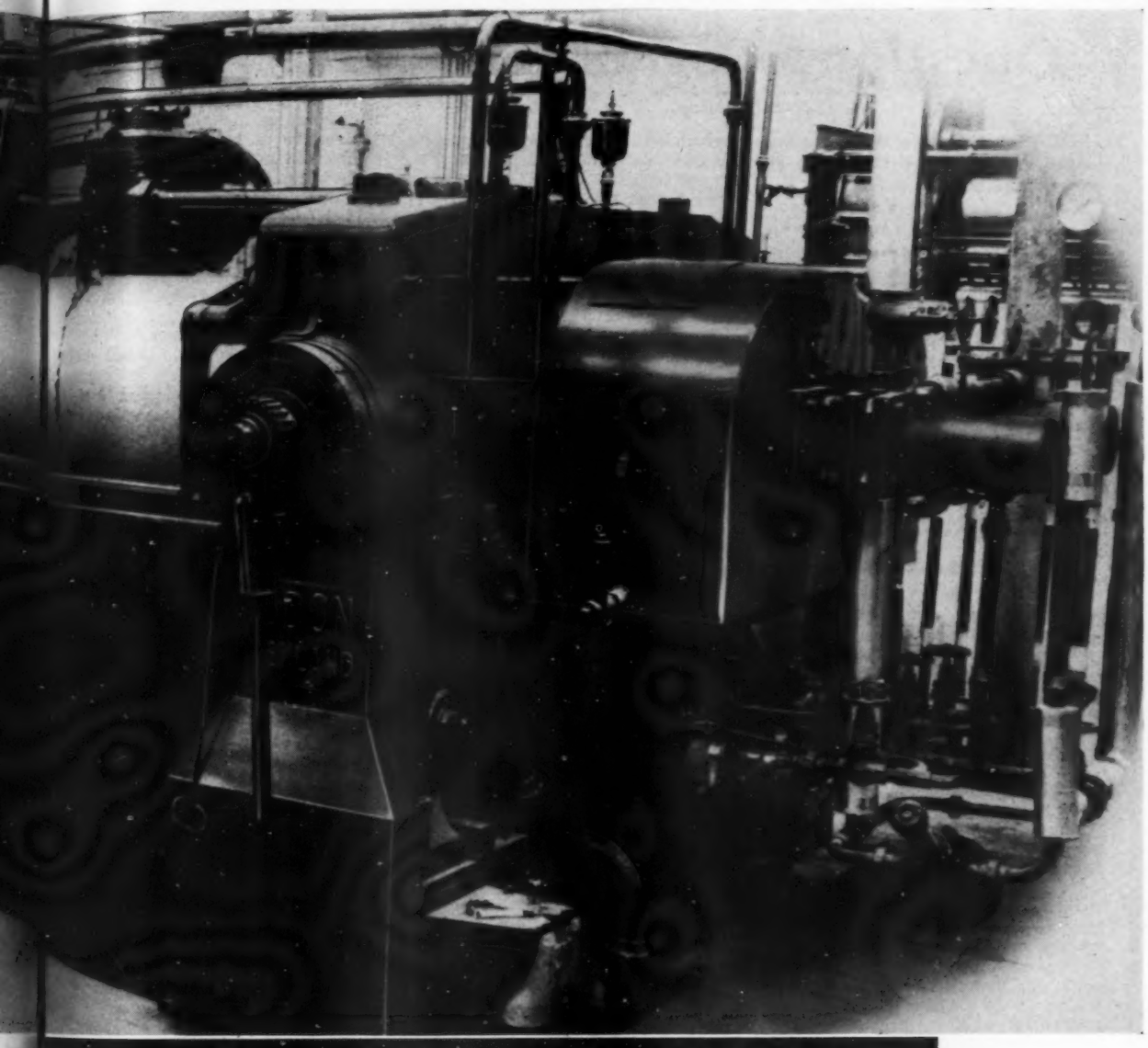
PHILIP SCHIDROWITZ

BIG This is NEWS

IDDON
BROTHERS LIMITED

The Consultation Service of our technical staff is freely available

MANUFACTURERS OF MIXING MILLS, PRESSES, CALENDERS AN



Twin Unit Mills

Photograph by courtesy of Messrs. B.T.R. Industries Ltd., Leyland, England

ONCE AGAIN IDDON'S LEAD THE FIELD

In 1950 IDDON'S produced the first new 22" x 60" Mixing Mill mounted on vibro-insulators.

In 1959 IDDON'S are again the first to produce a Twin Unit of 22" x 60" Mills with central drive and mounted on vibro-insulators.

LEYLAND, LANCASHIRE

Telephone : LEYLAND 81258/9 *Telegrams : IDDON, LEYLAND*

...don Representative: Mr. J. Summers, Room 16, 4th floor, Abford House, Victoria, London S.W.1 *Tel : VICtoria 1488*

... and CANADIAN Technical Sales and Service: WILMOD MACHINERY CO. LTD., 2488 Dufferin Street, Toronto 19, Canada.
Telephone : Toronto RUssel 1—5647 and 1—5648. *Cables : Wilmo, Can, Toronto*

AN...TRUDING MACHINES FOR RUBBER AND PLASTICS INDUSTRIES

Questions Corner—69

(Second Series)

295. What are the chief features in the commercial polymerization of polystyrene?

296. In the condensation of phenol, amino and other materials with formaldehyde, the product becomes increasingly less soluble in water. Give some methods of determining their solubility.

297. What is the mechanism involved in the heat degradation of polyvinyl chloride?

298. For some applications a laminate of cellulose film with another material is required. How is this produced?

(Answers next week)

Answers to Questions Corner—68

291. The use of mixed metal stabilizers arises from the observation that a combination of alkali earth metal and heavy metal gives better stabilization than either metal alone. This is known as synergistic action (*Br. Plast.*, September 1952). The ratio of alkali metal to earth metals may be varied over a wide range and depends on the particular application required. One may have a high cadmium-low barium ratio.

Organo-tin products are useful as, not only are they good heat stabilizers but also good light stabilizers.

The mechanism by which these stabilizers function is stated to be that they react with hydrogen chloride in a manner similar to other metals.

The most powerful stabilizers are probably those containing divalent sulphur bond to the tin. It is not understood whether the sulphur acts as an anti-oxidant, or whether it assists by reacting with the double bond systems and preventing the growth of the polyene structures.

Epoxy stabilizers contain the reactive group —CH(O)CH— which reacts with the hydrogen chloride to form —CH(Cl)—CH(OH)— (chlorohydrin). The thermal stability of this reaction product is not very good and decomposition will occur at high processing temperatures and consequently such stabilizers are rarely used by themselves. Three types are available, *viz.* epoxidated vegetable oils, esters and glycidyl ethers (*Br. Plast.* 1954, *27*, 307).

292. Depending on the final application, cellulosic sheet or film may require coating, colouring, slitting, plate polishing or laminating. In the form in which cellophane leaves the casting machine, its water resistance is rather low and it cannot be heat sealed. Both deficiencies are overcome by applying a lacquer coating to both surfaces. The lacquer is based on cellulose nitrate, together with plasticizers, resins and a small percentage of paraffin wax. The nitrocellulose acts as a heat-sealable coating and the wax the water vapour permeability. Other types of coating have been developed and are summarized in *Ind. Eng. Chem.* 1952.

Cellulose acetates and triacetates are used for photographic film and, to obtain a good adhesion between the film and the photographic emulsion, it is necessary to precoat the cellulose film with a thin coating of gelatin dispersed in active solvents. It contains no silver. For many applications it is necessary to colour a film, and this can be done during the casting in the case of cellophane, or during extrusion in the case of cellulose acetate, or by subsequent tinting.

In casting, the film may be cast on a sand-blasted surface, or it may be post-embossed under hydraulic pressure between engraved plates. In the latter case it must be cooled before removing from the plates.

293. Originally dough moulding was a method developed for using scrap from the hand-tailoring process of lay-up. In fact, the American term of 'gunk' means scrap or waste. However, with the continued success of the process for certain applications it was soon obvious that the supply of scrap was insufficient to provide the quantity of material required for continuous production. Now special resins, glass fibres and machinery are used to prepare the compounds.

Essentially the process consists in mixing glass fibres with polyester resins, filler, catalysts and pigments to give compounds which vary from putty-like to clotted fibrous masses. The longer the fibre length the less plastic the material. Usually the glass fibres vary from ¼in. to 2in.

Two methods of mixing the fibre with the resin, etc., can be used. In the first, the fibre is cut to the required length and then mixed with the resin in a double Z-bladed mixer. Alternatively, the fibre may first be coated with the resin and then cut to the required length. About 20% by weight of glass fibre is about the upper limit of these compounds.

When moulding there is a tendency for the resin to flow leaving the glass fibres behind and, to combat this, fillers are added to the resin so as to reduce its flow, and also to select a resin which does not change in viscosity with a rise in temperature.

Polyester resins for this type of compound usually include high boiling point monomers, *e.g.* vinyl toluene, instead of monomeric styrene. This is because when styrene is used during the moulding the exothermic heat generated by the mass of the compound boils the styrene and results in a somewhat porous product.

294. Polyvinyl alcohol is manufactured in various grades of different viscosities, *viz.* high, medium and low. The degree of hydrolysis is virtually complete in each of the viscosity grades, whilst the minimum degree of hydrolysis in each grade is about 86%.

High viscosity polyvinyl alcohol has the lowest water sensitivity, the sensitivity increasing as the degree of polymerization is reduced. Similarly, tensile strength, tear, elongation at break are quite good in the high and medium molecular weight polymers.

A quality of polyvinyl alcohol which permits wide application is its property of water solubility, combined with high tensile strength and tear strength.

Water is the only practical solvent for polyvinyl alcohol, but large amounts of monohydric alcohols, *e.g.* methanol, can be added to aqueous solutions. The amount of toleration for such solvents increases as the percentage hydrolysis of the polyvinyl alcohol decreases. When the amount exceeds the toleration limits, part of the polymer is precipitated. Completely hydrolyzed grades have limited solubility in most organic solvents. Some polyhydroxy compounds which are solvents, *e.g.* ethylene glycol, glycerine, require heat to dissolve the polymer, and when the mixture is cooled to room temperature gelling occurs. Diethylenetriamine and triethylenetetramine will dissolve polyvinyl alcohol at room temperature.

Soluble salts sometimes present in dyestuffs and pigments will thicken the polyvinyl alcohol solutions.

Water-immiscible plasticizers are incompatible with polyvinyl alcohol but glycerine or ethylene glycol are useful plasticizers.

(More questions next week)

'Carbon Black—a mistake in the copy letter'

MEN *and* MATTERS

A Review of People and Events

by George A. Greenwood

IT is very much more a matter this week, so far as rubber and plastics are concerned in the industrial and commercial spheres, of events, rather than of people, although some people come into the arena. As a continuation of what I was writing about last week concerning that important interchange in the House of Commons Budget debate on Anglo-Russian trade, it has become even more evident that the Prime Minister and his colleagues regard this as one of the very big issues of the moment. At the weekend it was announced that Sir David Eccles himself, as President of the Board of Trade, would lead the United Kingdom delegation which is to go to Moscow next month, and that he would be accompanied by a considerable group of advisors.

The mission is to consist in the main of senior officials from the Board with specialized and technical knowledge of the industries in which the Soviet Government is particularly interested, and a small number of prominent business men. I understand that when it was first decided that representatives from industry should be included in the Mission there was hesitancy about it from certain quarters on the ground that if they were to go without some specific undertaking, the reason for their presence in the Mission might be misconstrued both here and in Russia. It has now been made quite clear, however, that this will not be the case. The business men are to be nominated or selected, as far as possible, by the trade associations and similar bodies with which their firms are connected, and which are particularly interested in the expansion of Anglo-Soviet trade. That should rule out any question of self-interest on the part of any member of the Mission, even if, as is most unlikely, the visitors were disposed to engage, if they could, in business ' on the side.'

For Finland, Too

In the meantime, the London Chamber of Commerce has sent by air to Helsinki a Mission which is to discuss Anglo-Finnish trade with important industrial and commercial groups. On the other side the arrangements have been made by the Finnish-British trade associations, and four or five specific groups there are to collaborate. It is really, I am told, an effort to push forward British exports which have lately been losing ground in certain sectors against competition from other countries, especially European. The Mission is headed by Mr Val B. Arnott, Chairman of the London Chamber's Anglo-Finnish Section. Although we are repeatedly being told that the Finnish call for exports includes both rubber in various manufactured stages, and plastics, in which markets Germany are certainly competitors, there does not appear to be anybody in the Mission specifically to represent these interests, but I see that Mr R. E. Rushan of I.C.I., is one of those going.

Competition in Cables

The fact that two of the four major price-fixing agreements in the cable industry are to be dissolved at the end of the month is exciting a great deal of interest both in cable making and in rubber trade circles. The agreements, which end next Thursday, are those of the Rubber and Thermoplastic Cable Manufacturers' Association—broadly the manufacturers of domestic electrical wire—and those of the Mains Cable Manufacturers' Association. These two agreements are now in process of being withdrawn from the Register of Restrictive Trading Agreements and, in an article discussing future prospects the other day a ' Financial Times ' writer said that while no immediate reductions in the prices of cables are expected, ' some sections of the trade believe that a sharp price war will later develop, leading inevitably to further amalgamations within the industry.'

The writer went on to discuss developments and tendencies within the manufacturing concerns and more than hinted at a battle-royal between British Insulated Callender's Cables and Associated Electrical Industries which is introducing new and growing competition in the cable trade.

An important man has been brought into the controversy in the form of Viscount Chandos, Chairman of Associated Electrical Industries, whom we used to know as Mr Oliver Lyttelton, then a very able President of the Board of Trade, who is also now on the boards of I.C.I. and the British Thomson-Houston Co. Ltd., among other companies.

People in the rubber trade will care to learn that although he says it is true that the dissolution of the Cable Makers' Association is attributable to recent legislation, ' any suggestion that an additional reason is that British Insulated Callender's Cables and Associated Electrical Industries wish the battlefield cleared for a war of attrition between these two large groups is wide of the mark so far as

Pictured at the annual staff dinner and dance of the Ship Carbon Co. of Great Britain Ltd. are (*left to right*) **Mrs J. S. Woods; Mr J. H. Woods, managing director; Mrs J. H. Jewel; Mr J. H. Jewel, home sales manager**

AEI is concerned and, I believe, as far as BICC is concerned also.'

This issue is a little more than academic so far as rubber is concerned for although Lord Chandos thinks that two great undertakings must remain competitors in the cable field by conducting competition in the ordinary commercial way and not as part of a war upon the other parties, he adds that it seems clear that the interested must 'embark on further schemes of rationalization, and must get itself into a well-knit and muscular condition.'

Viscount Chandos has just returned from an extensive visit to Latin America, and in a lengthy article in the 'Financial Times' he has been giving his impressions of the situation in the various republics, such as the Argentine, Brazil, Chile, Mexico and Venezuela, with a total population of round about 130 million. Unfortunately he does not tell us in detail what sort of a market Latin America is for the goods which Great Britain could supply, to balance the exchange between the two countries, and enabling us to buy South American oil and agricultural produce. This is an important point, especially in view of the fact that the bigger nations like Brazil and the Argentine are forging ahead in specialized manufactures.

I was told some time ago, however, that in spite of the greater advantage of the United States in the matter of distance, we can get our plastics and plastic manufactured articles there to compete even after freights have been taken into account. That is a matter which, in view of all the circumstances, some of our plastics friends might care to look into and with advantage.

The P. and B. Rumours

There has been a revival of rumour during the past few days to the effect that a new bid is to be made for the take-over of the P. B. Cow Company, but I can find no grounds for them, and I understand that Mr Denzil Carlisle, whom Mr Harold Drayton, the head of this giant combine, put into the 'PB' chair two or three years ago, says there is nothing doing. This does not surprise me. This very week the company reports a group net profit of £154,991 — up from £147,935—and a dividend for the past twelve months of 12½% which also is up—actually from 10%.

Here and There

This is a belated note to say that Mr F. M. Richardson has been elected chairman of Chipatoojah Java Rubber Co. Selected Plantation and General Securities Investment Trust, which earlier this month declared its offer unconditional, has been appointed as secretaries. The remaining directors, Mr C. W. A. Murray, Mr F. C. Elliott and Mr H. G. F. Davis have resigned as well as the secretaries, Arnold and Murray. Mr Richardson, an M.A. and a C.C., is managing director of E. and F. Richardson Ltd., of Castle Mills, Buckingham, and his round dozen directorates include a seat on the board of the Selected Plantation and General Securities Trust.

Mr James Givan, M.A., LL.B., C.A., has, it is announced, just been appointed a Director of Kirby Rubber Estates. My latest reference books give him also as a member of the board of the Sungei Chinoh Rubber Co. Ltd., and of Malayan Products Ltd.

Mr Ronald G. Soothill, of Rochdale, the former joint managing director of Turner and Newall Ltd., whose election to the chairmanship of the company in succession to the late Sir Walker Shepherd I announced a few weeks ago, has been appointed a member of the board of the District Bank, which is so largely connected with industry, particularly in the North of England.

Colonel Sir William Fenton, Chairman of British Belting and Asbestos Ltd., with headquarters at Cleckheaton, Yorks., is to give the next Houldsworth Memorial Lecture at Heckmondwike Grammar School, founded to commemorate Sir Hubert Houldsworth's association with it as an Old Boy. Sir Hubert, who was chairman of the National Coal Board, and so well known in the rubber trade, and Sir William were contemporaries there.

Bakelite Retirement

From Bakelite comes the news that Mr E. J. Lassen who has been export manager since the export unit was established in 1945, has retired after 28 years' service with the company. His successor is Mr George Harrison Johnson who has been deputy export manager for the past year. Mr Johnson, now 41, is a Northerner from Stockton-on-Tees, but he left there in his middle teens and has since been in the South. For a while before the outbreak of the Second World War he was with the Bushing Co. on the technical side and after serving during the war in the RAF he joined Bakelite in 1945. From work in the sales department he gained further experience until he became assistant export manager, and in the course of the years has made many friends in the industry. He is married, with one child, and his home is at Epsom.

IRI Midland Section

THE HUMAN FACTOR IN PRODUCTIVITY

NEARLY one hundred people attended the IRI Midland Section's meeting at Wolverhampton on Monday April 13 at the Goodyear Tyre and Rubber Co. Mr J. Q. Shaul, Director of Production, Goodyear, presided over the meeting. After refreshments in the Goodyear Pavilion, Mr J. Maslin, personnel director of Accles and Pollock, spoke on 'Personnel Management—The Human Factor in Productivity.' Mr Maslin explained the difficulty of forecasting the results likely to be obtained from men as distinct from machines and materials. That part of the management function concerning itself with human relations within the organization was defined as personnel management. The problem of getting the best out of human material demanded a specialist—the personnel manager, to advise management and others how to get people to give of their best.

Mr Maslin went on to describe the three groups of factors bearing on the problem. Wages—most important here perhaps was an equitable wage structure. Working conditions—heating, ventilation, transport, canteen services, social amenities. If these were as good as reasonably possible, then it became plain to all that the company was trying to do its best for its staff. There remained a number of intangibles which affected the individual as an individual; for example, men and women should be employed on work that suited them best, and neither above or below their abilities; there should be fair opportunities for promotion; supervision and leadership must be efficient and at the same time hold the confidence of the workers.

The discussion was opened by Mr K. N. Walker, personnel manager, Goodyear, and the lively exchange that followed showed the great interest in this subject. There was a wide range of opinion on incentives and bonus schemes, and the subject of promotion from within or from without was debated too. Another speaker pointed out the importance of communications, to inform staff at all levels what was going on and to give them a sense of participation in company affairs. Mr H. S. Briers, personnel manager, Dunlop, proposed a vote of thanks to Mr Maslin for his thought-provoking talk, and also thanked Goodyear for their much-appreciated hospitality.

Rubber samples (ASTM bent loops) after 72 hr. exposure to 40 pphm ozone at 100° F. Severely damaged sample is a high-cost polymer cured 40 min. at 298° F. and supposedly stable against ozone attack. The other is an SBR formulation containing 3 phr UOP 88, cured 40 min. at 284° F.

NOW...prevent ozone damage, cut product cost, too!

SBR compound with UOP antiozonant withstands ozone better than supposedly stable high-cost polymer— yet costs substantially less!

The rubber test strips shown above tell a story that's mighty important to your profit picture. In addition to the obvious superiority of one over the other is this significant fact:

The test strip riddled with cracks is a high-cost polymer used for its resistance to ozone—the other a conventional SBR polymer protected with UOP antiozonant at substantially lower overall cost.

When you include UOP 88 or 288 in your formulation, the versatile chemical barrier slowly and uniformly migrates to vulnerable rubber surfaces—and thus keeps your product free of unsightly, degrading cracks throughout its entire life, regardless of the severity of conditions to which it may be subjected.

Using UOP 88 and 288 antiozonants you produce a top quality ozone-resistant product at minimum cost. Can you afford to do otherwise? Detailed information and samples are yours for the asking. Just write our Products Department.

* Registered trademark

Available in England through
Universal-Matthey Products Limited
STOCKINGSWATER LANE,
BRIMSDOWN, ENFIELD, MIDDLESEX

UOP*

UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road, Des Plaines, Illinois, U.S.A.
More Than Forty Years Of Leadership In Petroleum Refining Technology

Telephone: HOWard 4066/7/8 Cable and Telegrams: Unimatthey, Enfield Registered Office: 78 Hatton Garden, London, E.C.1

Tyre Symposium

Details of the Tyre Symposium, arranged by the Institut Français du Caoutchouc, have now been published and are as follows:

May 20. Conference opens at 9.30.

10 o'clock: 'Deformation of the Constituent Parts of the Tyre in Motion,' by Dr V. L. Bidermann (USSR) Tyre Research Institute, Moscow.

10.45: 'Measuring Tyre Deformation by Extensometer,' by Dr W. F. Kern (All. Fed.) Metzeler Gummiwerke A.G.

11.30: 'Trials of Tractor Tyres—Influence of Carcase Structure,' by M Mazza et Amici (Italy) Pirelli.

2.30: 'Methods and Types of Apparatus used to Measure Road Slipperiness,' by M. G. Mathieu.

3 o'clock: 'Studies on Skidding Undertaken at the Belgian Road Research Centre,' by M. J. Daube.

3.45: 'Influence of the Size and Distribution of Road Surface Particles on Skid Resistance,' by M Van der Burgh (Holland).

4.30: 'The Tyre and the Road,' by Pr R. Ariano (Italy).

May 21.

9.45: 'Tests of Resistance to Freewheeling,' by Dr Kolimann (All. Fed.).

10.20: 'Rolling Resistance in High Speed Tyres,' by M. V. I. Novopolsky (USSR) Tyre Research Institute, Moscow.

11.10: 'Rolling Resistance of Tyres in Sand—Problem of Tyres in the Sahara,' by MM E. Chapoux and L. Romani (France).

2.30: 'Study of Friction on Lubricated Surfaces,' by Dr D. Tabor (Great Britain). 'Recent Researches into the Role of Hysteresis of Rubber in the Measurement of Resistance to Skid,' by M. G. Giles and B. Sabey (Great Britain).

3.45: 'Special Apparatus for the Study of the Influence of the Tyre on the Coefficient of Skid,' by M. J. L. Escario (Spain).

4.30: 'Some Observations on Skid Resistance of Road Surfaces in Snow or Ice,' by Pr Wehner (All. Fed.).

5 o'clock: 'Observations on the Performance of the Tyre in the Neighbourhood of and at the Limit of Adherence,' by M. M. Julien (France).

May 22.

9.45: 'Relation between Road and Laboratory Tests — Effect of Tyres on Vehicle Performance,' by M. W. Johnson (USA).

10.30: 'Mechanism of Tyre Wear,' by Dr A. Schallamach (Great Britain).

11.30: 'Report on the Dynamic Rigidity of the Tyre,' by Dr Chiesa and M. Tangorra (Italy).

2.15: 'Side Force and Slip in the Tyre Contact Area,' by Mr Cooper, Mr Gough and Mr Hardman (Great Britain).

4 o'clock: 'Reactions between Tyre and Road,' by Dr Hofferberth (All. Fed.).

The Symposium takes place on May 20 21 and 22. Further details from the Institut Français du Caoutchouc, 42 Rue Scheffer, Paris, 16eme.

REVIEW

ELEMENTS DE SCIENCE ET TECHNOLOGIE DU CAOUTCHOUC.—J. Le Bras. (Paris: SETCO, 3rd edn., 1958, pp. xviii, 435. Price 2,000 Frs.)

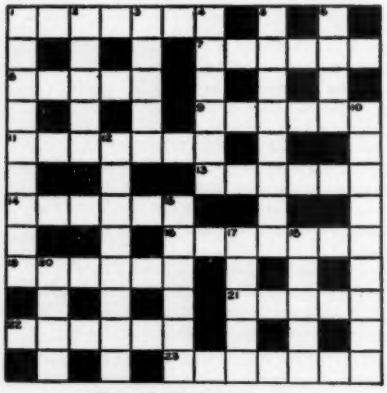
By its previous French editions and its translations into other languages, this book has become established as a useful basic text on rubber science and technology. The author, a well-known authority on rubber, is General Scientific Inspector of the Institut Français du Caoutchouc and other French rubber research organizations overseas and was awarded the IRI's Colwyn Medal last year.

The introductory chapter contains a brief historical survey, figures for production and consumption of rubber, notes on the rubber manufacturing industry in various countries and a concise account of the organizations concerned with rubber research and development. The sources and preparation of natural rubber, including the concentration of latex, are discussed in the second chapter, and there are two chapters on the properties of latex and its direct use in the manufacture of rubber products. Nine chapters, representing about two-thirds of the book, are devoted to the physical and chemical properties of rubber and its structure, theoretical aspects of rubber chemistry, vulcanization, compounding ingredients, rubber processing including the equipment employed, synthetic rubbers, ebonite, reclaim and rubber derivatives. The two remaining chapters are on rubber products and on the analysis and testing of latex and rubber.

This third French edition does not differ substantially from the English translation reviewed in our issue dated August 3 1957 page 149. However, to bring the text up to date, some new material has been incorporated, as for example, reference to SP rubber, antiozonants and the Oakes continuous automatic mixer for the production of latex foam and there are a number of additional illustrations. As befits a book of this scope, bibliographic references have not been cited, but there is a list of books on rubber, limited mainly to those published since 1945.—R.W.P.

∴ Copies may be ordered through the Books Department, RUBBER JOURNAL AND INTERNATIONAL PLASTICS, Maclaren House, 131 Great Suffolk Street, London, S.E.1.

RJIP CROSSWORD



CROSSWORD No. 67

CLUES ACROSS

1. A well-known vulcanizing agent.
7. Ficticious, NR is included.
8. A deputy doctor in short.
9. This hat has net at the end.
11. To purify.
13. This can be rubber-covered when used by the printer.
14. The channel which appears mixed-up when a chap leaves gutta percha.
16. Not a rod again for a compounding ingredient.
19. A relative finishes this course of instruction.
21. A point and another tile for the best.
22. Replenish from another filler.
23. A hard form of carbon.

CLUES DOWN

1. Dehydrating agent (6, 3).
2. Pecuniary gain is a cruel turn.
3. Descriptive of us all.
4. SBR or neoprene, for example.
5. In this form compounding ingredients are dustless.
6. Colouring agent.
10. This becomes worn with driving so try red tea again (4, 5).
12. Fitments of this description are associated with 10 across in slippery circumstances.
15. 'Eth's' fiancée's full name.
17. Following light for Gilbert and Sullivan.
18. These phenol compounds are used as antioxidants.
20. Not odd, but five is included.

(Solution appears on page 644)

Plantation Commentary

RPC REPORT NOT OPTIMISTIC

by our Malayan Correspondent

THE report of the Rubber Producers' Council for last year, a year in which commodity prices in general did not look so good, is not, surprisingly, optimistic and cheerful. It was by no means a good year for the rubber industry compared with the Korean War years but there was hope for the future and a not too unhappy present.

The Council, which represents producers in general in Malaya and is the most powerful voice on the planting industry, with special reference to rubber, points to the unmistakable conviction which the rubber producers have shown over the years in the future of their product. The report emphasizes that an enormous amount of money has been spent since the war on replacing old rubber trees with modern high-yielding varieties.

'One good conclusion to be drawn from the recessionary world of 1958 is that this faith has been largely proved to be well founded,' says the report. 'While the market for many commodities has decreased just about every pound of natural rubber produced was readily placed and this against the background of available world synthetic facilities not being worked to their full capacity.

'Neither was the market price of rubber unduly depressed and indeed this remained fairly constant at a level where many Malayan producers believe that it should remain in the future—that is fully competitive with comparable grades of synthetic.'

The council's views on the Malayan Government's efforts to find a scheme for price stabilization are interesting and have obviously been carefully phrased. The council does not disagree with the Government, but seems to have as many doubts and reservations as the more outspoken members of the industry who point-blank reject the scheme.

In full the council says, 'The council's view on price stabilization, in line with that of the Federation Government, is that it would welcome a practicable scheme to achieve this end which is acceptable to both the producers and consumers of natural rubber. However, in a free market there must be fluctuations in accordance with the law of supply and demand although judging from the last two years these will not in future be of the violent character which has caused so much concern to both manufacturers and producers in the past.

'The expanded world synthetic facilities now in existence may well ensure this with their ability rapidly to increase or decrease output to equate world supply of all rubbers with demand.'

On replanting, the report states that about 80,000 acres of estate land were replanted last year and 60,000 acres of smallholdings. By the end of last year 41% of the 3,500,000 acres planted to rubber had been replanted with high-yielding material. This is further broken down to show that of the two million acres of estate land, 52% has been replanted while for the 1½ million acres of smallholdings the figure is 26%.

Commenting on the call by the Minister of Commerce and Industry, Mr Tan Siew Sin, for a million acres of virgin land to be planted with rubber in the next 10 years, the council's report says that this 'should be taken to heart by all if the future prosperity of the country and employment opportunities for the rapidly expanding population are to be assured.'

Significantly it adds: 'This will remain largely a dream, however, unless the State Governments co-operate to the full in making land readily available for rubber planting,' a reference to the extreme delays that have occurred in obtaining new land for rubber. The council urges the 11 State Governments in Malaya to bend their energies to clearing up the backlog of work in the land offices to ensure speedy action in the future.

Finally the report comments on the stealing of rubber on estates, a problem that is steadily becoming worse. The council notes that thefts were on a widespread scale and that the Government appointed a committee to overhaul existing legislation on rubber supervision.

'It is to be hoped that this committee will commence its deliberations shortly so that one law throughout the country will be devised to cover all aspects of the situation,' says the report.

Opposition to Stabilization

One of the first planters openly to step into the lists against rubber stabilization schemes is Mr H. Paterson, the president for the fourth year of the Perak State Planting Association, who declared at the association's annual meeting that a rubber restriction scheme would be catastrophic for Malaya.

He warned those who might be considering the idea that natural rubber restriction would encourage the production of synthetic rubber in every consumer country in the world and thus lose many of Malaya's markets. Planting would be encouraged in countries not covered by the restriction and he questioned whether the countries in the agreement could guarantee that rubber restriction could be carried out.

'During the first rubber restriction scheme (pre-war) Indonesia was not a member and was thus able to receive and sell many thousands of tons of rubber which were smuggled from Malaya,' he said. 'Before any restriction of natural rubber can be brought into being every rubber producing country from the largest producer to the smallest must join in partnership together with the governments guaranteeing that the rules and regulations of restriction could be enforced.'

Mr Paterson said: 'A rubber restriction scheme would have to embrace thousands of smallholders in various countries who depend on rubber for their living and the lower the price of rubber the more they would have to produce to keep up their living standards.

'It would also be found that the imposition of restriction would, after a short time, make less money available for replanting.'

Mr Paterson pointed out that since the whole future prosperity of the Malayan rubber industry depended on replanting with the resultant low cost of production due to lower yields, it would be catastrophic to allow restriction on this point alone.

He added that restrictions on rubber in any shape or form would benefit the manufacturers of synthetic at the expense of Malaya and other producing countries.

US Announcement

A news agency report from New York announcing commercial production of a synthetic rubber that 'duplicates the tree-grown product,' from US Rubber Company and Shell Chemical Corporation, has not worried rubber producers here unduly. The price, US30 cents a lb., as quoted in the agency report, was considered to be rather cheaper than had been thought possible but in general Malayan producers have their tails up over the steady success of the replanting programme and are confident that, all things being equal, there is no reason why there should be particular concern about the arrival of the new synthetic.

There were doubts about the capacity of the companies to produce large amounts of the polyisoprene rubber.

The most authoritative statement came from the Rubber Research Institute which said that as far as could be judged the new synthetic was likely to be interchangeable with the natural product but it doubted whether it could be as easily produced as natural.

The institute said that the discovery of a synthetic having a structure almost identical with natural was announced

Ferguson Shiers Limited

FAILSWORTH, NEAR MANCHESTER

RUBBER AGE

(NEW YORK)

One of the World's Outstanding Rubber Journals

Keep up with developments in the rubber industry in the U.S.A. and Canada. A subscription to RUBBER AGE (no affiliation with any other rubber journal) will provide you with the latest information on technical advances — news — markets — statistics.

Rubber . . . latex . . . vinyls . . . polyethylene and other rubberlike materials fully covered in every issue.

If you have not seen a recent copy of RUBBER AGE, send today for a specimen copy.

Published monthly, subscription price : $6.00 per year in England and the Continent.

Also Publishers of the

RUBBER RED BOOK

The only Directory of the Rubber Industry in the United States and Canada.

1957-8 Edition,
$12.50 post paid.

Published by

PALMERTON PUBLISHING COMPANY, INC.

101 West 31st Street · New York 1 · N.Y. · U.S.A.

three years ago by a number of American companies.

The Goodyear Tire and Rubber Co. had announced in January this year that they were working on a plant capable of producing 20,000 to 30,000 tons a year. 'It an also be assumed that the Iron Curtain Countries are working on similar lines,' said the statement. 'The new rubber's properties are almost identical with those of the natural product but we have no direct experience of the new material ourselves since supplies in sufficient quantities for technological testing have not been available.'

The institute said that analysis had been carried out by the British Rubber Producers' Research Association and the results showed little or no structural difference from that of natural rubber. 'As far as we can tell the new synthetic rubber should be interchangeable with the natural product and it might well be that the controlling factor in its use will be cost and availability,' said the institute.

'We would like to have evidence that the new synthetic is easier to produce than natural rubber. From recent statements and photographs in the technical Press, production of the new material entails the use of complicated plant and some of the process appears to be hazardous to personnel. On the other hand, recent statements regarding the type of process indicated that a pilot plant could run 24 hours a day for five or six days a week with very little supervision.'

The chairman of one of the biggest estate agency houses here, Mr J. Brown, giving the producers' view, said that the price of the synthetic was uncomfortably close to the present price of natural rubber.

'We have known of the discovery of the new synthetic for some time,' he said. 'The only new factor is the price of 30 US cents a lb. It used to be more expensive and the future price will depend on the quantity that can be produced. The synthetic is a factor that must be considered but I do not think that there will be any immediate effect on the price of natural rubber.'

He added: 'From all statistics received the world consumption of all types of rubber will steadily increase with the years and there should always be room for the natural product.'

The chairman of the Rubber Producers' Council, Mr Leong Hoe Yeng, said: 'I do not think that there is anything to worry about so far for we can compete at 30 US cents a lb.' He doubted if any synthetic would be the same, in all respects, as natural.

'Natural-Synthetic'

A new slant on the rivalry between synthetic and natural was given at the annual general meeting of the Penang Rubber Trades Association by the president, Mr Heah Joo Seang, one of the leading rubber traders in Malaya. He called for a 'natural-synthetic rubber' based on plantation rubber and other products.

'I am convinced that this new product will prove superior to man-made rubber,' he said. 'As natural rubber cannot cope with the demand it follows that the shortage must be filled by synthetic.'

Mr Heah considered that it would be a serious mistake if Malaya did not take steps to produce this type of rubber, which could be turned out at a more economical cost, to meet the demands of the manufacturers. It was a suggestion, he felt, that should receive early consideration by the new Research Bureau.

He also urged the need for a joint council in Asia to further the needs of rubber research in the producing countries.

Retirement

Sixty-six-year-old Mr H. D. L. Fisher, a planter who has been working in this country for 40 years, is not going to retire to Britain after all. He has decided to stay in Malaya instead because since independence he has found conditions in this country 'very satisfactory.'

Mr Fisher was first attached to Rim Estate, in Malacca, after coming to Malaya in 1919 after which he went to the East Coast. During the Japanese occupation he was interned. He has become a Malayan citizen and is now living quietly in a guest house in Malacca.

Mr Fisher's original plan was to settle in Britain and he bought a house when he returned here in 1957. He found the climate too cold and instead came back last year.

An all-round sportsman, Mr Fisher played for four years before the war with the Malacca State soccer team, captained the Malacca Club at soccer, rugger and cricket, and was founder-member of the Malacca Swimming Club.

A visit to a rubber estate, Sungei Way Rubber Estate, not far from Kuala Lumpur, was high on the itinerary of the United Nations Secretary General, Mr Dag Hammarskjold, *right*, during his recent visit to Malaya. First he watched how a rubber tree was tapped, with the manager of the estate, Mr MacDonald-Bennett. Then he had a try himself. The tree will not be tapped again but will be painted blue, the colour of the United Nations. The next tree to it was 'tapped' by the President of India, Dr Rajendra Prasad, and is painted in the national colours of India

Plastics in New Vapour Blasting Equipment

A new type of vapour blasting equipment, fabricated from Vybak industrial rigid PVC sheet made by Bakelite Ltd., is now being marketed

Close-up through the observation window of Britain's first Hydrotron vapour blasting unit, built almost entirely from plastics, which is installed at one of the research laboratories of D. Napier & Sons, Ltd., Luton. The equipment is being used to clean aluminium and copper foil prior to bonding operations connected with de-icing development work

under the trade name 'Hydrotron' by Metachemical Processes Ltd. of Crawley, Sussex.

The Hydrotron is built almost entirely from plastics materials and comprises basically a Vybak blasting cabinet and supporting structure, beneath which is located a large polythene container for holding the abrasive slurry. Compressed air is used to displace the slurry from the container to the blasting gun housed in the cabinet. Other design features include a rigid PVC extractor unit with nylon impellor, built-in rubber sleeves to protect the operator's hands, and an automatic washing device for the observation window.

Among the advantages claimed by the designers are that the abrasive within the slurry cannot be contaminated by the rigid PVC and that particle speed is higher than with any other known equipment.

Rubber Statistics

YEAR-END BREAKDOWN FOR NATURAL AND SYNTHETIC — ITALY

THE Secretariat of the International Rubber Study Group, in its latest Bulletin, gives a detailed breakdown of natural and synthetic rubber production and consumption during 1958. In the following table, which is expressed in 1,000 long tons, natural rubber production is seen to have fallen 47,500 tons behind the 1957 level.

NATURAL PRODUCTION

	Jan.-Dec. 1958		Jan.-Dec. 1957	
Malaya:				
Estates ..	390¾		369¾	
Smallholdings	272¾		269	
		663½		638¾
Indonesia:				
Estates ..	237½		252½	
Smallholdings	377		432	
		614½		684½
Ceylon		100		98
Thailand ..		137½		133
Sarawak ..		39		41
Other British Borneo		21		21
Liberia ..		42		38
India		24		23½
Belgian Congo..		40½		39½
Others		173		185¼
		1,855		1,902½

The main cause of the shortfall in natural rubber production in 1958 was the reduction in production on Indonesian estates and smallholdings. Most other producing countries showed a slight increase in output compared with the previous year. In particular, output on Malayan estates increased by 5% or 6%.

The following tables show the natural rubber consumption totals for the two years:

NATURAL CONSUMPTION

	Jan.-Dec. 1958	Jan.-Dec. 1957
UK	175½	181½
USA	485½	538¾
France	136¾	135
Western Germany	129	136
Remainder of Europe	472	358½
Others	586½	537¾
	1,985	1,887½

The following are the individual figures for synthetic consumption:

SYNTHETIC CONSUMPTION

	Jan.-Dec. 1958	Jan.-Dec. 1957
UK	63	57½
USA	872	926
France	55	50
Western Germany	54½	47
Remainder of Europe	57	56
Others	126	121
	1,227½	1,257½

Italy

Details of Italian rubber consumption during 1958, as reproduced by the Study Group from an Italian source, show that, out of a total natural rubber consumption of 49,006 metric tons, tyres and tubes accounted for 28,660 tons, technical and other articles for 14,999 tons, footwear for 2,483 tons, and cables for 1,430 tons. This total included 8,894 tons of latex, 25,045 tons of smoked sheets, and 356 tons of sole crepe.

In the case of synthetic rubber, 15,491 tons went into tyres and tubes, 3,602 tons into technical and other articles, and 1,972 tons into cables. S-type rubber accounted for 15,677 tons, of which 811 tons were of latex, while 1,930 tons of neoprene, 3,130 tons of butyl and 861 tons of N-type were also consumed, making a total of 21,598 tons.

In addition, 7,269 tons of reclaim rubber were also consumed, 3,907 tons going into tyres and tubes, 2,659 tons into technical and other articles, and 325 tons into footwear.

ASTM Marburg Lecture

Dr Herman F. Mark, director, Polymer Research Institute of the Polytechnic Institute of Brooklyn, will present the annual Edgar Marburg Lecture at the 62nd annual meeting of the American Society for Testing Materials at Chalfonte-Haddon Hall, Atlantic City, on June 23. His subject will be 'New Polymers—New Problems.'

BSC SEAL

The British Safety Council has launched a new scheme for approving equipment/products and appliances as 'safe.' A manufacturer submits his product for testing, which is carried out by selected independent laboratories. If the product meets the high standards of safety set by the Council, the manufacturer is awarded the certificate and seal of approval. Either of these may be used in advertising and promotional material and further, may be stamped on the product itself.

Periodic tests will be carried out. These will ensure that standards are constantly maintained.

The British Safety Council Seal which can be used in advertising and promotional material

---

Fawcett Preston and Co. Ltd., the Bromborough engineers who are part of the Metal Industries Group, announce the appointment of Mr C. Smith as contracts manager in the electrical division and Mr A. J. Taylor as sales office manager.

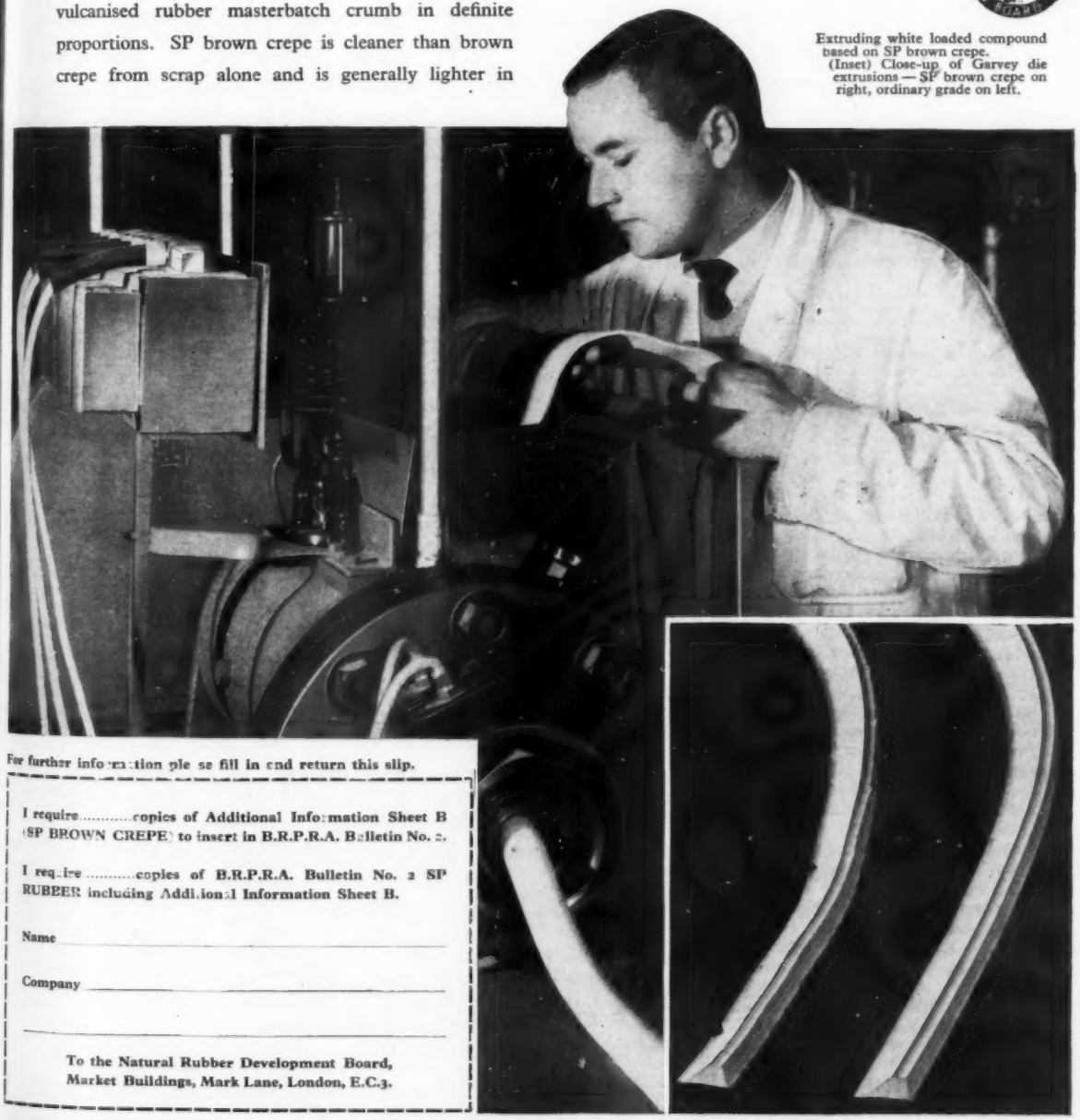
One of the latest additions to the Bex range of products made by the Halex Division of British Xylonite Co. Ltd. is a red rigid polythene fire bucket. A D-shaped section reduces the distance of projection from walls and the risk of spilling by swinging. It costs 27s. 3d.—with the lid 4s. 2d. extra

More scope for SP rubber

A big step forward in the development of Superior Processing natural rubber is its introduction into the lower grades. SP brown crepe, which has just come on to the market, has all the outstanding advantages of SP rubber familiar to users of SP.RSS, SP air dried sheet, and SP crepe.

To impart the SP properties lump and other high grade scrap produced on estates is blended with a vulcanised rubber masterbatch crumb in definite proportions. SP brown crepe is cleaner than brown crepe from scrap alone and is generally lighter in colour. It is prepared under licence from the R.R.I. Malaya and every batch has to conform to technical specification to ensure uniformity.

SP brown crepe is recommended for all uses for which the better grades of scrap rubber are suitable. It gives better quality extrusions of finer finish and improved physical properties. It is available through the normal trade channels.



Extruding white loaded compound based on SP brown crepe. (Inset) Close-up of Garvey die extrusions — SP brown crepe on right, ordinary grade on left.

For further information please fill in and return this slip.

I require.....copies of Additional Information Sheet B (SP BROWN CREPE) to insert in B.R.P.R.A. Bulletin No. 2.

I require .....copies of B.R.P.R.A. Bulletin No. 2 SP RUBBER including Additional Information Sheet B.

Name _____

Company _____

_____

To the Natural Rubber Development Board, Market Buildings, Mark Lane, London, E.C.3.

PATENT SPECIFICATIONS

The following information is prepared from published Patent Specifications. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 3s. 6d. per copy (including postage).

Removing Flash from Moulded Articles

No. 808,521. The Distillers Co. Ltd. Inventor: T. B. Philip. Application, June 26 1956. Filed, May 23 1957. Published, February 4 1959.

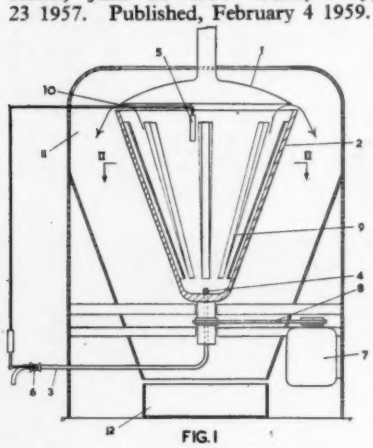


FIG. 1

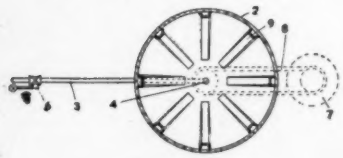


FIG. 2

The invention relates to an apparatus and method for removing flash at low temperature from moulded articles made from rubber or plastics. Fig. 1 is a section of the apparatus and Fig. 2 is a cross section of the container at II—II without the surrounding annular chamber. As shown in the drawings, the apparatus comprises a container 2 having an aperture 10 and an internal space of decreasing cross-sectional area from the aperture along an axis passing at right angles through the plane of the aperture. The container is rotatable about this axis and is provided with a closure member 1. Vertical ribs 9 are fixed to the interior of the container, the moulded articles impinging upon these ribs during rotation of the container.

In operation of the apparatus, the closure member 1 is raised and the articles to be treated are placed in the container. The closure member is then lowered to the position shown and liquid carbon dioxide is passed through the pipe 3 and nozzle 4 into the lower end of the container. When the desired low temperature is reached the supply of further liquid carbon dioxide is controlled by a thermostat 5 acting upon a valve 6. The container is then rotated by means of a motor 7 operating through a belt 8 and the flash is removed by contact between the articles and with the ribs 9. The flash thus removed is thrown up the wall of the container by centrifugal force and is ejected from the aperture 10 into the annular chamber 11 from which it descends into the collecting tray 12. After removal of the flash, rotation of the container is continued as the closure member is raised and the cleaned articles are ejected from the container into the annular chamber 11 from which they descend into a collecting tray as in the case of the flash.

Spring Assembly

No. 808,789. Lemförder Metallwarengesellschaft mbH. Application and Filed, December 7 1956. Application in Germany, December 8 1955. Published, February 11 1959.

A spring assembly or mounting for machinery comprises a layer of polyurethane with a foam-like structure sandwiched between two non-metallic plates of relatively rigid material. These plates are preferably made of solid polyurethane but alternative materials of construction are wood, ceramics and synthetic resins. The exposed surface of the foam-like polyurethane may be covered with a layer of solid polyurethane of a softer quality than that used for the plates. The spring assembly is highly resistant to compression and fatigue as well as being resistant to oil and to deterioration by ageing.

Shorter Abstracts

Colourless Polythene. 806,655. Bergwerksgesellschaft Hibernia AG. Filed, February 21 1956.—Impurities are removed from polythene produced by low-pressure polymerization by treatment of the polythene with a very dilute solution of a high-boiling mono- or polyhydric alcohol. Discolouration of the polythene on working up is thus prevented.

Ferrule. 805,939. H. E. Husgen and R. R. J. Daniels. Filed, October 30 1956.—A rubber ferrule for a tubular steel chair leg is reinforced with a steel core provided with one or more prongs which grip the chair leg and hold the ferrule securely in position.

Rubber Crop Returns

RUBBER ESTATE AGENCY LTD.

	March 1959 lb.		Fin. year to date lb.		No. of mths. of fin. year to date
Bandar Sumatra	86,500	(67,000)	835,000	(742,000)	8
Batu Kawan	55,700	(50,400)	423,300	(415,059)	7
Buntar	89,000	(78,000)	882,300	(798,800)	9
Eastern Sumatra	270,000	(263,000)	270,000	(263,000)	1
Amalgamated Rubber	37,400	(39,600)	116,600	(114,400)	3
Java Rubber Plant	97,020	(104,500)	278,080	(286,660)	3
Jeram	*247,500	(178,500)	2,935,000	(2,265,100)	12
Kepitigalla	54,500	(50,000)	716,500	(615,500)	12
Kuala Lumpur	385,225	(333,438)	3,903,120	(3,152,199)	9
Langkat Sumatra	70,000	(76,000)	233,000	(236,000)	3
Soember Ajoe	26,400	(30,800)	170,720	(180,400)	6
Sungei Bahru	86,000	(72,000)	1,189,000	(1,222,000)	12
Sungei Chermang	200,000	(180,000)	1,909,000	(1,889,000)	9
Sungei Kahang	144,800	(143,200)	144,800	(143,200)	1
Tambira	88,600	(96,560)	982,070	(1,045,280)	9
Tamiang (Malaya)	72,000	(55,000)	446,600	(355,000)	6
Tanjong Malim	297,500	(256,700)	3,167,900	(2,710,300)	9
Sennah	162,800	(154,000)	448,800	(448,800)	3

*Including crop from Tuan Mee Estate.

THOMAS BARLOW AND BRO.

	March 1959 lb.	Fin. year to date lb.	
Bradwall (FMS)	84,800	318,300	(402,500)*
Chersonese (FMS)	46,000	153,000	(140,000)
Highlands Malaya	394,700	1,321,300	(1,270,450)
Klabang Rubber	66,000	243,000	(223,500)
Krian Rubber	2,800	16,300	(26,240)
Muar River	90,000	335,000	(418,000)
Sungei Krian	128,500	424,500	(471,500)
Manchester North Borneo	65,135	806,124	(708,284)

*Three months. All the rest 12.

GEO. WILLIAMSON AND CO.

	March 1959 lb.	Fin. year to date lb.	
Ceylon (Para)	113,931	(85,625)	413,582 (387,184)

BONDING?
Your answer may lie in—

THIXON
BONDING AGENTS

There is a wide variety of one and two coat systems which covers the whole field of problems encountered by rubber technicians

Exclusive British Agents

WITCO CHEMICAL CO., LTD.

Head Office: **BUSH HOUSE, ALDWYCH, LONDON, W.C.2**
Telephone: TEMple Bar 6473/6476
PEARL HOUSE, PRINCESS ST., MANCHESTER 2 (Central 9066/8) 62 ROBERTSON ST., GLASGOW C.2 (City 3493)
Works at: **UNION LANE, DROITWICH SPA, WORCESTERSHIRE**
Also at · NEW YORK · CHICAGO DETROIT · AKRON · BOSTON · CLEVELAND

YEARS AHEAD!

★ MONOBLOCK MILLS

★ "ROSS-WARNE" MILLS

★ MONOBLOCK "ROSS-WARNE" MILL CONVERSIONS

Please write for full particulars
to the ***PIONEERS AND SOLE MANUFACTURERS:***

REED BROTHERS
(ENGINEERING) LIMITED

REPLANT WORKS, WOOLWICH INDUSTRIAL ESTATE, LONDON, S.E.18 **Tel: Woolwich 7611/6**

Rubber and Plastics Stock Market

A REVIEW OF PRICES AND TRENDS

THE market in the past week or so has continued to reflect the very encouraging Budget. The buying has, however, been very selective and in the past few days has been on the decline. It is now apparent that there is a considerable volume of investors waiting on the sidelines to take their profits directly the date of the General Election is announced.

There is a growing fear that prices could decline quite sharply in the future, prior to an election, but this is being offset to some extent by the continued activity in the market of the leading investment institutions.

The shares of plastics and rubber manufacturing concerns have in the main been well supported. Following the improved results which were mentioned here LAPORTE INDUSTRIES ordinary shares have been in demand and have recently touched a new peak for the 1958/59 period of 23s. 4½d.

For a similar reason ALBRIGHT AND WILSON ordinary have been a very good market. The volume of buying has not been heavy at any time but it has been steady enough to lift the shares from 22s. to 22s. 9d. in three weeks.

The full report of the P. B. Cow concern showed very little change in the existing figures. The net asset position improved slightly to £2,464,000 while net current assets gained around £70,000 at £1,383,000. There has been some talk (this time not in the City) of a take-over of this concern by the DUNLOP group. It would seem that the 'talkers' are not prepared to support the shares, for since we last went to press the price has *declined*. The board of P. B. Cow must by now be aware of this idle chatter but it has not felt it necessary to issue a denial.

The ordinary shares of the RFD concern have on the other hand been a very firm market purely on talk of a take-over. Again the name of Dunlop is being mentioned as the likely bidder. This rumour is no new one. It has already been the rounds once, and at that time it looked as though it would eventually prove right.

The buying of COURTAULDS seems to have subsided. It may be remembered that the Americans were said to be supporting the shares and there was some concrete evidence of American buying. However, the company has moved while the share price has remained more or less stationary. It has announced terms for an offer to the shareholders of the HARBENS rayon yarn concern. The actual deal involves cash to the tune of £675,000 and there is no reason why it should not be accepted. This is the fourth or fifth deal that the Courtaulds group has announced in as many months. Most of the others have been aimed at the diversification of the group rather than to adding to its existing interests.

The board of HERMETIC RUBBER has announced a maintained interim of 10%. Last time the total dividend was 25% and the interim is obviously a pointer to the maintenance of the full rate again.

Continued on page 641

Share Price Movements

Par Value	Company	1958-59 High	Low	April 11	Latest
5/-	Albright & W. Ord. ..	22/9	13/4½	22/6*	22/4½
£1	,, ,, ,, 5% Pref...	16/7½	15/4½	16/3	16/3
5/-	Anchor Chemical Ord...	13/6	10/3	12/6	13/6
5/-	Andersons Rub. Ord. ..	4/3¾	3/-	3/1½	3/0¾
2/-	Anglo-Amer. Vulc. Fibre Ord.	4/3	2/-	3/4½	3/3¾
£1	Angus Geo. Ord. ..	29/10½	21/-	29/-	28/3
5/-	Armitage (Sir Elk.) Ord.	4/10½	2/3	4/6	4/6
5/-	Ault & Wiborg Ord. ..	13/9	11/9	13/6	13/-
£1	Avon India Rubber Ord.	42/-	27/-	36/10½	37/3
£1	,, ,, ,, 6% Pref.	18/6	17/3	17/6	17/6
10/-	Bakelite Ord.	27/9	17/-	25/6	27/-*
£1	,, 6% Pref. ..	19/6	18/3	18/3	18/3
£1	Baker Perkins Ord. ..	47/-	30/7½	43/6	45/-
4/-	Bank Bdg. Rubber Ord.	2/7½	1/6	2/-	1/10½
5/-	Boake (A.) Roberts Ord.	18/6	9/-	13/-	13/3
£1	,, ,, ,, 5% Pref.	15/1½	13/9	13/9	13/9
4/-	Brammer H. Ord. ..	17/-	9/-	16/6	16/4½
5/-	Bridge, David Ord. ..	27/9	16/3	27/6	27/6
5/-	Bright, John Ord. ..	13/10½	8/9	10/9	10/10½
2/-	Brit. Ind. Plas. Ord. ..	8/1½	4/9	7/7½	7/7½
2/-	,, 10% (tax free) Pref.	5/9	4/8½	4/9	4/9
£1	British Xylonite Ord. ..	57/9	28/6	55/-	55/6
£1	,, ,, 5% Pref.	15/6	14/-	15/7½	14/9
5/-	BTR Ind. Ord.	13/3	9/4½	10/6	10/3¾
£1	,, ,, 7½% Pref. ..	22/6	20/9	22/6	22/6
£1	Courtaulds Ord... ..	35/10½	20/-	33/-	33/3
£1	,, 5% 1st Pref.	18/6¾	15/7½	16/9	16/9
£1	,, 6% 2nd Pref.	19/6	17/1½	19/6	19/6
4/-	Cow, P. B. Ord. ..	6/7½	3/6	6/-	*5/10½
£1	,, 5% Pref. ..	13/6	10/9	13/3	13/3
5/-	Dale, John Ord... ..	15/-	10/-	11/-	11/4½
£1	,, ,, 6% Pref. ..	15/10½	13/-	16/-	15/7½
1/-	Dannimac Mfg. Ord. ..	6/2½	2/6	5/7½	6/-
10/-	De La Rue Ord. ..	35/6	20/9	34/9	35/3
£1	,, ,, ,, 3½% Pref. ..	11/9	10/-	10/3	10/4½
6/8	Distillers Co. Ord. ..	27/-	15/9	25/6	25/3
£1	,, ,, 6% Pref...	21/0¾	19/10½	21/-	21/-
£100	,, 5% Conv. Loan	£96½	£91	£93½	£93½
£100	,, 5½% Unsec. Loan	£93½	£87 7/16	£93	£93
10/-	Dunlop Rubber Ord. ..	26/7½	14/9	25/6	26/6
£1	,, 5½% Pref.	18/9	15/10	17/6*	17/4½
£100	,, 3½% 1st Debs.	£75	£67¾	£75	£75
£100	,, 4½% 2nd Debs.	£82¾	£78	£82½	£82½
4/-	Ebonite Cont. Ord. ..	15/3	7/6	14/3	13/6
£1	English China Clays Ord.	60/6	29/9	60/-	60/3

Par Value	Company	1958-59 High	Low	April 11	Latest
£1	Goodyear Tyre 4% Pref.	12/9	12/-	12/6	12/6
5/-	Greeff Chem. Ord. ..	17/9	14/-	17/-	17/-
10/-	,, ,, 5½% Pref...	8/-	7/9	8/-	8/-
4/-	Greengate & Irwell Ord.	7/0¾	4/9	5/9	5/9
£1	Harrisons & Crosfield Dd.	61/3	43/9	56/3	60/-
1/-	Hunt & Moscrop Ord. ..	1/5	1/1½	1/3	1/3
£1	Imp. Chem Ord. ..	38/-	28/3	34/6*	34/4½
£1	,, ,, 5% Pref. ..	17/3	16/-	16/6	17/-
£100	,, 4½% Unsec. Loan	£88½	£80	£88	£88
£100	,, 5½% Conv. Loan	£121	£99	£115	£115½
1/-	Kleemann (O. & M.) Ord.	5/5¼	2/6	5/1½	5/-
£1	,, ,, 6½% Pref.	16/9	15/-	16/6	16/6
2/-	Lacrinoid Prod. Ord. ..	2/5½	1/5¾	2/-	2/-
5/-	Laporte Ind. Ord. ..	23/4½	13/7½	22/10½	23/3
£1	,, ,, 7½% Pref.	22/10½	21/10½	22/9	22/9
£1	Leyland & Birm. Rubber Ord.	—	—	52/9	53/-
£1	,, ,, 6% Pref.	21/3	16/1½	16/10½	16/10½
2/-	London Rubber ..	14/4½	8/6¾	14/-	14/0¾
£1	,, 6% Red. Cum. Pref.	19/9	16/3	18/9	18/9
£1	McKechnie Bros. Ord.	45/-	32/6	45/-	45/-
£1	,, ,, 'A' Ord.	44/6	30/-	40/-	40/6
£1	,, ,, 6% Cum. Pref.	16/3	16/-	16/3	16/3
5/-	Monsanto Chem. Ord. ..	16/4½	13/-	15/9	15/10½
£1	,, ,, 3¾% Pref.	12/6	11/-	12/6	12/6
£100	,, 6% Debs.	£104	£101½	£104	£104
£1	North British Rubber ..	—	—	15/3	15/3
5/-	Redfern Holdings Ord...	—	—	3/1½	3/2½
2/-	RFD Ltd. Ord.	6/6	3/5½	6/3	6/6
£1	,, ,, 5½% Pref. ..	14/9	11/6	14/9	14/6
2/-	Rubber Imp. Ord. ..	15/6	6/-	7/9	8/-
2/-	,, ,, 'A' Ord.	14/3	6/-	7/6	7/9
£1	,, 5% 1st Pref.	12/3	10/-	10/-	10/-
5/-	Rubber Reg. Ord. ..	13/-	11/-	10/6	11/-
4/-	Shaw Francis Ord. ..	18/-	9/9	16/3	16/4½
2/-	Silentbloc Ord. ..	8/6½	7/6	7/9	8/0¾
2/-	Sussex Rubber Ord. ..	1/8	7¾	1/4½	1/4½
5/-	Sutcliffe Speak Ord. ..	7/4½	5/-	6/9	6/10½
£1	Turner & Newall Ord. ..	76/4½	52/-	71/6	71/10½
£1	,, ,, 7% Pref.	24/-	22/1½	23/3	23/3
5/-	Universal Asbestos Ord.	21/-	8/0¾	20/6	20/9
5/-	Viscose Dev. Ord. ..	10/7½	6/3	10/-	10/-
5/-	Warne William (Holdgs.) (Ord.	12/9¾	8/-	12/6	11/9*

*Ex-dividend

Rubber Markets

LONDON

The tone of the London rubber market has remained very firm during the past week and further, but small, gains have been scored compared with previous levels. The Spot is nearly a farthing better at almost 28d. per lb., while the forward positions are widely ½d. to a farthing per lb. higher. Prices reacted at one time on fears that strikes in the US may reduce rubber consumption but the market picked up again later.

Latest prices are as follows:

No. 1 RSS Spot: 27⅞d.-28d.

Settlement House:

May 27⅞d.-28d.

June 28d.-28⅛d.

July/September 28⅛d.-28¼d.

October/December 28⅛d.-28¼d.

January/March 28d.-28¼d.

No. 1 RSS cif basis ports:

May 27⅜d.-28d.

June 27⅜d.-28d.

Godown:

May 94⅝ Straits cents nominal.

LATEX

Centrifuged latex per gallon in drums, May/June shipment, 16s. 5d. seller, cif European ports. Spot, seller, 16s. 7d. Bulk, seller, 16s. 4d. Creamed, seller, 15s. 11d. Normal, seller, 12s. 5d.

AMSTERDAM

The Amsterdam rubber market ruled as under on April 20:

No. 1 RMA	Guilders per kilo Apr. 20	Previous
April	.. 2.67	2.67
May	.. 2.69½	2.67
June	.. 2.69½	2.67
April/June ..	.. 2.70	2.69½
July	.. 2.71½	2.70
August	.. 2.72	2.70
September ..	.. 2.72	2.70
July/September	.. 2.72½	2.72½
October ..	.. 2.71	2.71

Sales: 15. Tendency: Steady.

DJAKARTA

Values held steady with good interest noted for ready and nearby delivery rubber on April 20. Export certificates were quoted at 332 paid/buyer.

	Rupiahs per kilo Apr. 20	Previous
Spot No. 1 Priok ..	24.70	24.45b
Spot No. 2 Priok ..	24.00	23.75b
Spot No. 3 Priok ..	23.00	22.85b
No. 1 fine pale crepe ..	23.50	23.40b

Tendency: Steady.

BANGKOK

No. 1 RSS

The price for No. 1 RSS, at Bangkok on April 20 was 30.62½ (30.62½) US cents per lb.

NEW YORK

The New York rubber market ruled as under on April 20:

DEALERS' PRICES

US cents per lb., ex-dock

	April 20	Previous
No. 1 RSS, April	33⅜b–33⅝a	33⅜b–33⅞a
May	33⅜b–33⅝a	33⅜b–33⅞a
No. 2 RSS, April	32⅝b–33a	33⅛b–33⅜a
May	32⅝b–33a	33⅛b–33⅜a
No. 3 RSS, April	32⅛b–32⅜a	32⅜b–33a
May	32⅛b–32⅜a	32⅜b–33a
No. 1 RSS, Spot	33⅛b–33⅜a	33⅜b–33⅞a
No. 3 amber blanket crepe, June	31½b–31¾a	31½b–31¾a
No. 1 latex, thin crepe, April	33n	33⅛n
No. 1 latex, thick crepe, April	33⅜n	33⅜n

FUTURES—REX CONTRACT

	Close	Prev. Close
May ..	34.05b–34.20a	34.60b–34.70a
July ..	33.90 –33.95t	34.25 —34.30t
September	33.35b–33.45a	33.60t
November	33.30t	33.50t
January ..	33.15b–33.30a	33.45b–33.50a
March ..	33.05b–33.25a	33.35b–33.50a
May ..	32.95b–33.15a	33.25b–33.50a

Sales: 79. Tendency: Easy.

Rubber futures were slightly lower in modest volume, on April 20. Traders said selling pressure on the market was small, with the undertone of physicals steady. The strike at US Rubber, Firestone and Goodrich influenced the market adversely.

CREPE RUBBER

The following prices ruled in New York on April 15:

Dealers' selling prices:	Cents per lb.
Sole crepe, standard grade 'A'	46 (46)
Thick crepe	34¼ (34¼)

SYNTHETIC RUBBER

The following prices ruled in New York on April 15:

	Cents per lb. April 15	Previous
GR-S, fas New Orleans	23.25	23.25
Neoprene GN, fob Louisville	41	41
Neoprene W, fob Louisville	39	39
Butyl, fas New Orleans	23	23
Paracril, fob Baten Rouge	50	50

CEYLON

No. 1 RSS

The price for No. 1 RSS, spot, at Colombo on April 20 was 120 (120/121) Ceylon cents per lb.

SINGAPORE

Prices opened around previous levels on April 20, and the market then ruled very quiet. There was little interest in lower grades but fair underlying interest was shown in remilled grades. The afternoon was rather more active but with little change in price levels. The turnover was fair. After-hours, the market was quiet.

Straits cents per lb., fob Malayan ports to open ports

	Close	Previous Close
No. 1 RSS, May ..	95⅛—95⅞	95⅜—95¾
June ..	95¾—96⅛	95⅝—95⅞
No. 2 RSS, May ..	95 —95½	94½—95
No. 3 RSS, May ..	94 —94⅜	93¾—94⅛
No. 4 RSS, May ..	92⅛—93	92⅛—92¾
No. 5 RSS, May ..	91⅛—91¾	91 —91½
No. 1 RSS, Spot ..	95⅜—95¾	95⅛—95⅜
No. 3 blanket, thick remilled, May ..	90 —92	89½—91½
No. 1 fine pale crepe, May	99 —100	99 —100
2X thin brown crepe, May	91½—92½	91½—92¼

Tendency: Quiet.

The Industrial Syndicate quote latex, native produce, 60% centrifugal, packed in rec. drums fob at 186.20d. per gallon.

STOCK MARKET

Continued from page 640

DE LA RUE ordinary shares became an active market following the official news of the formation of its new offshoot, FORMICA INTERNATIONAL. This reaction to the plan was somewhat surprising particularly as the main details were (or should have been) already known by the City. The new subsidiary is a holding company in which AMERICAN CYANAMID has a 40% interest. It will control subsidiaries manufacturing Formica plastics in the United Kingdom, Australia, Germany, France and New Zealand. It must be appreciated that the formation of this new offshoot could have far-reaching effects on the future prosperity of the De La Rue concern and a long term rise in the ordinary shares would not surprise many City observers.

The news of a dividend rise from the BRITISH XYLONITE concern was taken more quietly than many had expected. The actual final payment is 12% which compares with 10% a year ago. This brings the total for the year up to 15% compared with 13%.

The ordinary shares at 55s. 6d. although slightly higher showed very little response to what one would have thought was a rather cheerful item of news.

There was one very nasty shock for shareholders last week. It came from the RUBBER IMPROVEMENT group which announced that the interim dividend is to be passed. The directors also went on to warn that the deterioration in trading conditions is such that the final distribution is also in some jeopardy.

Last year the total dividend was 45%. Following this news, the 2s. ordinary shares tumbled 3s. 3d. in one day to 4s. 7½d., and there seems little ground for justifying this level, so a further fall would not be surprising.

Mr Ben Davis, chairman of MUSICAL AND PLASTIC INDUSTRIES stated that prospects for the record side of his concern are exceptionally good. This company is already represented in the manufacture of 45 rpm records and will soon embark on the sale of 12in. long players.

Industry INTELLIGENCE

Technical Data

Microcellular Soling to Meet Satra Specification

A recipe for soft microcellular rubber soling is given in Polysar Technical Report No. 7, 11C, by W. J. Abrams, distributed in the UK by Polymer (UK) Ltd., Walbrook House, Walbrook, London, E.C.4. The compound is based on a blend of Polysar Kryflex 252 (SBR) and Polysar Krynol 652 (oil-extended SBR). Both these rubbers are light-coloured and non-discolouring, so that the soles can be made in any desired colour shade. Data for the physical properties of the vulcanized material are given, and these meet the requirements of Satra Provisional Specification No. 8/55 for general purpose microcellular soling. The Specification figures are quoted in the report.

Chemigum N-8 and PVC Blends

Chemigum N-8 is a nitrile rubber of high gel content suitable for blending with PVC and a report of an investigation of blends of these two materials has recently been issued by Hubron Sales Ltd., Albion Street, Failsworth, near Manchester. The first part of the report comprises a comparison between Chemigum N-8 and three normal nitrile rubbers in blends with PVC, while the remainder of the report is concerned with the use of blends of Chemigum N-8 and PVC for (a) flooring and (b) cable covering.

Chemigum N–8 has an acrylonitrile content of 32%, and the three normal nitrile rubbers used in the first part of the investigation contained 40%, 32% and 21% of acrylonitrile. The compounds employed had a content of 100 parts of PVC, 15 (or 30) parts of nitrile rubber and 45 (or 36) parts of a mixture of a monomeric and a polymeric plasticizer, with and without addition of filler. The control stock had a content of 100 parts of PVC and 54 parts of the plasticizer mixture.

Processing trials were run on a laboratory mill and in a laboratory extruder while the standard tests for physical properties used in the evaluation of vinyl compounds were applied. Of the three normal nitrile rubbers tested, the rubber with the highest acrylonitrile content gave the compound with the best processing characteristics, although all of them were inferior to the PVC control stock. The Chemigum N–8 was markedly superior to the normal nitriles and in several instances, equal to the PVC control.

The application of immediate interest for blends of Chemigum N–8 and PVC is flooring compounds, and to furnish information on this usage, Chemigum N–8 was compared with five other nitrile rubbers in a compound of this kind. It contained 100 parts of PVC (flooring grade) and 25 parts of the nitrile rubber, together with plasticizers and fillers. There were considerable differences in the processing characteristics of the compounds containing the various nitrile rubbers, the compound containing Chemigum N–8 comparing favourably with the others. The concluding section of the report is concerned with the development of blends of PVC and Chemigum N–8 for cable sheathing and insulation. The compounds had a content of 100 parts of PVC and 125 parts of Chemigum N–8 together with 15 parts of a processing aid of the methacrylate resin type. Extensive tables of test results for all the compounds used in the investigation are given at the end of report.

Machines, Materials and Equipment

Compressed Air Regulator

The Baldwin Instrument Co. Ltd., Dartford, Kent, announce production of a new speed regulator, for use with their compressed air cylinders. These new units are a development of the earlier micrometer type, and have a regulation of three times that of the previous model. The bore sizes are

¼in., ½in., ¾in. and 1in. The new speed regulator is slightly larger, and utilizes the same two-piece construction as its predecessor. The unit is made from duralumin, which is anodized. A friction device incorporated in the body of the regulator prevents the micrometer adjustment from being disturbed by vibration. Where the speed movement of an air cylinder is required to be different in each direction of movement, the new Baldwin speed regulator is a simple means of producing this. This regulator screws directly into the exhaust ports of the directional control valve, and thereby throttles the escape of air from the exhaust end of the cylinder. Where steadiness of motion is required, this method of speed regulation is to be preferred.

Publications Received

IMPA Corrosion Protection

IMPA Ltd., industrial and marine protective applications manufacturers and chemical engineers, have issued a catalogue entitled 'Protection Against Corrosion and Chemical Attack.' This publication covers the range of chemically-resistant thermoplastics—polythene, PVC, fluon, nylon, etc.—manufactured by the company. The range of items covered by the publication is impressive, with a page devoted to each item. The details given are too comprehensive to review entirely. Polythene is available in tube, sleeve, rod or sheet form and in black or natural colour. The fittings to go with polythene tubes, in several bores, include three-piece unions and valves and taps, etc. A variety of polythene containers, both large and small, are described. The foregoing products are also made in PVC, both rigid and high-impact, and other PVC fabrications include flange covers, special mats, hand pumps, angle valves, ball valves and strainers, etc. Perspex sheet, rod, bar and tube are made in several sizes, and a number of miscellaneous products—washers, welding rods and welding equipment and accessories—are available.

Glycerine Data Sheet

A new data sheet gives a useful summary of the physical properties of glycerine including short tables showing specific gravity, freezing points and vapour pressure/relative humidity data for different concentrations of glycerine in water.

The data sheet also describes the three principal grades of refined glycerine namely: Chemically Pure, which conforms to both BS 2625 and the current British Pharmacopoeia. Technical Grade, which conforms to BS 2623 and is suitable for most industrial uses including paper, alkyd resins, adhesives, dyestuffs and many other products, and Dynamite Grade, which conforms to BS 2624.

Printed on heavy board to make it a durable reference the brochure is available on request to The Secretary, The United Kingdom Glycerine Producers Association Limited, 5 Bridewell Place, London, E.C.4.

British Standards

Domestic Articles Made from Low Density Polythene

Part 1, Circular Washing Bowls. BS 3094: 1959. The standard specifies that the material from which the bowl is made shall not have a density greater than 0.93 g/ml. at 20°C. The bowl shall be of good surface finish, reasonably free from flow lines or blemishes, and any sprue shall be removed by cutting. The bowl shall have a turned-over rim or some other means by which it can be lifted when in use. The thickness of the bowl at the sides and bottom shall be such as to enable it to comply with the specified distortion test. There shall be no diminution of the thickness in the vicinity of the sprue due to sinkage, drawing in of material, or to the removal of the sprue. After specifying the dimensions of the bowl, this Standard goes on to give details of tests—reversion, splitting, surface attack and distortion.

Part 2, Buckets. BS 3094: 1959. The standard specifies that the material of the bucket shall be natural or coloured polythene. The density of the material from which the bucket is made shall not be greater than 0.93 g/ml. at 20°C. Where metal handles are used they shall be corrosion resistant. The thickness of the bucket at the sides and bottom, and the construction of the handle, shall be such as to enable it to comply with specified distortion tests. There shall be no diminution of thickness in the vicinity of the sprue due to sinkage or drawing in of material at this point, or to the removal of the sprue. When tested, the specimens cut from the buckets shall fulfil the following requirements: Limit of reversion, maximum diminution in length of 5%; limit of splitting, maximum opening of the slit of 0.1in. (2.5mm.); surface, no delamination beyond the appearance of fine fissures. When tested by the above method, the bucket shall fulfil the following requirements: Maximum increase in diameter of top, at right angles to the handle, 10% of initial; maximum increase in depth from rim at handle lugs to bottom of bucket, 7% of initial.

Copies of these standards may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1. Price 3s. Postage will be charged to non-subscribers.

Changes of Name

Vinit Developments Ltd. (617,430), Orient House, New Broad Street, London, E.C.2.—Name changed to Central Johore Building and Development Co. Ltd. On January 8 1959 Sedenak Rubber Estates Ltd. and Malaya General Co. Ltd. were each allotted 33 shares and Mengkibol (Central Johore) Rubber Co. Ltd. were allotted 34 shares.

Mac Gentle Ltd. (244,496), 60 New Bedford Road, Luton.—Name changed to Macgentle (Tyres) Ltd.

Future Events

April 25—May 7

INSTITUTION OF THE RUBBER INDUSTRY

Tuesday April 28. Meeting of the Council of the Institution at 2.15 p.m.

London Section.—Tuesday May 5 at the Wellcome Foundation, 183 Euston Road, London, N.W.1, at 6.30 p.m. 'Precision Cast Moulds and Tools for the Plastics Industry,' by C. Shaw. By invitation of the London Section, Plastics Institute.

Midland Section.—Thursday April 30 at the James Watt Memorial Institute, Great Charles Street, Birmingham, at 6.45 p.m. Annual general meeting.

Scottish Section.—Tuesday April 28 at the Institution of Engineers and Shipbuilders in Scotland, 39 Elmbank Crescent, Glasgow, C.2, at 7.30 p.m. Annual general meeting to be followed by a talk and film entitled 'Rubber in Building,' by F. E. Jones, F.R.I.B.A.

PLASTICS INSTITUTE

London and District Section.—Tuesday May 5 at the Wellcome Foundation, 183 Euston Road, London, N.W.1. Annual general meeting followed by 'Precision Cast Moulds and Tools for the Plastics Industry,' by C. Shaw.

Midlands Section.—Monday April 27 at the Queen's Hotel, Birmingham. Annual luncheon. Tuesday April 28, visit to the Central Fire Station.

Plastics and Polymer Group, Society of Chemical Industry.—Tuesday May 5 at the SCI Meeting Room, 14 Belgrave Square, London, S.W.1. Annual general meeting followed by the chairman's address, 'The Pursuit of Polymers,' by C. E. Hollis.

Sheffield Group, Royal Statistical Society.—Thursday April 30 at the Cavendish Room, Grand Hotel, Sheffield, at 7 p.m. Annual general meeting, followed by 'A General Simulation Programme,' by Dr K. D. Tocher, United Steel Companies Ltd.

EXHIBITIONS

Corrosion Exhibition, Royal Horticultural Hall, London, April 27-30.

Engineering, Marine, Welding and Nuclear Energy Exhibition, Olympia, London, April 16-30.

National Education and Careers Exhibition, Olympia, London, May 26 to June 5.

National Industrial Safety Conference and Trade Exhibition, Scarborough, Yorks., May 8-10.

Latest Wills

Mr Frank Oswald Laughland, of 9 Grand Avenue, Hove, formerly of 149 Leadenhall Street, E.C., and Orchard Way, Beaconsfield, late of Bousted and Co. Ltd., East India merchants, former chairman of Cheras Rubber Estates Ltd., and chairman or director of other rubber concerns, who died on December 18 last, left £76,536 gross, £75,546 net value. (Duty paid £32,727.)

Mr Hereward Livingstone Fenton, of 210 High Street North, Dunstable, formerly of Kepong Malay Rubber Estates, who died on July 22 1958, left estate in Great Britain value at £11,743 gross, £9,911 net value. (Duty paid £399.)

MARKET COMMENT

U.K. and Continental demand pushed the Natural Rubber Market up again last week, thereby widening the gap between natural and synthetic prices. Dealers expect the market to stay high because of the fine balance between supply and demand.

WEEK ENDING APRIL 10th, 1959

NATURAL RUBBER PRICES LONDON MARKET SELLERS QUOTATIONS CIF ON FRIDAY 10/4/59 FOR APRIL SHIPMENT		SB RUBBER PRICES EX WORKS HYTHE OR EX STORE MANCHESTER		
RSS INTERNATIONAL NO. 1 (OFFICIAL PRICE)	27⅝	INTOL 1500		22
RSS INTERNATIONAL NO. 3 (UNOFFICIAL)	27¼	INTOL 1502		22
RSS INTERNATIONAL NO. 5 (UNOFFICIAL)	26½	INTOL 1710		17½
INTERNATIONAL 2X THIN BROWN CREPE	26	INTOL 1712		17½
SINGAPORE 'C' THICK BLANKET CREPE	25⅝	INTOL LATEX R23	PER LB. OF SOLIDS	22
LATEX 60% CENTRIFUGED IN BULK	15/4GAL	INTOL LATEX M23	NAKED	22

With the compliments of THE INTERNATIONAL SYNTHETIC RUBBER CO. LTD. HYTHE SOUTHAMPTON. ENGLAND.

The price differential between Intol Synthetic Rubber grades and natural rubber is effectively underlined by a new 'Public Relations Service' initiated by the International Synthetic Rubber Company. Cards, the first of which is shown above, are posted to buyers all over the country to arrive on their desks each Monday morning. The previous Friday's closing prices are quoted. On the reverse of the card is a week by week graph of ISR and natural rubber prices

Export Opportunities

Polythene Tubes for the Federation of Rhodesia and Nyasaland

The Secretary, Central Supply and Tender Board, P.O. Box 1009, Lusaka, has issued the following requirements: 1,260,000 polythene film tubes, 5in. wide when laid flat, 6in. in length, 200 minimum gauge; the film is to be of polythene to which stabilizing agents have been added to protect it from the weathering effect of sunlight, and carbon black added to render the colour black. Supply may be made in the form of a continuous roll perforated at intervals of 6in. to allow easy separation of individual tubes. A sample of the polythene offered must accompany tenders. Prices must be quoted on a for Lusaka basis. Delivery may be offered fob liner port, country of origin, in which case for price must be quoted in addition to price requested above.

It should be stated whether the supply is offered ex Federal Import Duty paid stocks (where applicable) or for consignment direct to Government from outside the Federation. If Federal Import Duty has been paid either on the items offered or on the material imported for their manufacture, the amount of such duty should be stated. Tenders should be placed in sealed envelopes marked 'Tender for Polythene Tubes.' It is the responsibility of tenderers to ensure that they are received before the closing time, 2 p.m. on Friday May 15. Telegraphic tenders will not be considered. B.o.T. reference ESB/9340/59.

The address of the Export Services Branch of the Board of Trade is Lacon House, Theobalds Road, London, W.C.1. Telephone number: Chancery 4411, extensions 776 or 866.

Increases of Capital

Rim (Malacca) Rubber Estates Ltd. (107,209), 110 Cannon Street, London, E.C.4.—Increased by £50,000, in 2s. ordinary shares, beyond the registered capital of £200,000.

Anglo Oriental Plantations Ltd. (formerly G. and H. Plantations Ltd.) (614,946), rubber estate owners, etc., 2, 3 and 4 Idol Lane, London, E.C.3.—Increased by £1,499,900 in 2s. unclassified shares, beyond the registered capital of £100. The £1 shares in the original capital have been subdivided into 2s. shares.

Solution to RJIP Crossword

(See page 632 this issue)

ACROSS.—1, Sulphur. 7, Unreal. 8, Locum. 9, Bonnet. 11, Cleanse. 13, Roller. 14, Gutter. 16, Odorant. 19, Lesson. 21, Elite. 22, Refill. 23, Diamond.

DOWN.—1, Silica Gel. 2, Lucre. 3, Human. 4, Rubber. 5, Granular. 6, Lake. 10, Tyre Tread. 12, Antiskid. 15, Ronald. 17, Opera. 18, Amino. 20, Even.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

HY-PLAC (780,424) For saponified wood resins for use as plasticizers and air-entraining agents for addition to cement, cement mortars, concrete, and to the like building materials. By John Beverley Miners, Flat No. 1, 6 The Drive, Wimbledon, London, S.W.20. (Class 2; March 25 1959.)

HY-PLAM (780,425) For saponified wood resins for use as plasticizers and air-entraining agents for addition to cement, cement mortars, concrete, and to the like building materials. By John Beverley Miners, Flat No. 1, 6 The Drive, Wimbledon, London, S.W.20. To be associated with No. 780,424 (4211, 317). (Class 2; March 25 1959.)

FOLATEX (781,769) For catheters made of latex rubber. By Eschmann Bros. and Walsh Ltd., 22-25 Bartholomew Square, Old Street, London, E.C.1. (Class 10; March 25 1959.)

Stiletto heel tips possessing exceptional abrasion resistance are now being manufactured by Redfern's Rubber Works Ltd., Hyde, Cheshire, using a top-piece compound based on Hycar nitrile rubber and Cellobond H.831 phenolic resin. The most important requirement of a top-piece compound is that it should not spread and that its abrasion resistance should be high since deformation and damage to the shoe would otherwise occur. Hycar nitrile rubber is manufactured by British Geon Ltd. and Cellobond phenolic resins by British Resin Products Ltd.

PATENT LIST

Printed copies of the Specifications in the following list can be obtained from the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d., including postage, but about six weeks after the date of this publication will usually elapse before they come available. Orders with remittance may be sent in advance to the Patent Office, and will be fulfilled immediately the Specifications are published.

COMPLETE SPECIFICATIONS ACCEPTED

Open to public inspection on April 15 1959

Pittsburg Coke and Chemical Co. Synthetic resin bituminous coating compositions. 811,905.

British Rubber Producers Research Association. Preservation of latex. 811,942.

B. Vergnano. Method and apparatus for making rubber mats. 812,011.

Esso Research and Engineering Co. Curing films of butadiene-styrene copolymers. 811,903.

Soc. Des Usines Chimiques Rhone-Poulenc. Polymerization of ethylene. 811,909.

E. I. Du Pont de Nemours and Co. Fluorinated polymeric materials. 812,116.

Regoma Co. Ltd. Method and mould for moulding tubular containers from plastic material. 811,866.

Veb Chemische Fabrik Grünau. Method of improving the dyeability of polyester fibres. 812,111.

Montecatini Soc. Generale per L'Industria Mineraria e Chimica. Modified polypropylene. 811,848.

G. Hammesfahr. Vulcanizing apparatus for vehicle tyres. 812,107.

American Cyanamid Co. Cyanoethylation of cellulosic materials. 812,063.

Distillers Co Ltd. Plasticized linear polyethylene. 811,777.

United States Rubber Co. Apparatus for determining and measuring thump. 811,810.

K. H. Steigerwald. Treatment of thermoplastic synthetic materials. 811,844.

C. F. Roser G.m.b.H. Treatment of polymers. 811,946.

Columbus Plastic Products, Inc. Die construction for injection-type moulding machine. 811,878.

Open to public inspection on April 22 1959

E. I. du Pont de Nemours and Co. Dielectric films of thermoplastic polymers. 812,470.

Firestone Tire and Rubber Co. Tubeless tyres. 812,396.

Bakelite, Ltd. Method of making moulds and cores. 812,203.

Farbenfabriken Bayer A.G. Dyeing and printing of textile materials of polymers of acrylonitrile. 812,227.

Midland Silicones Ltd. Organosilicon compounds. 812,252.

Imperial Chemical Industries Ltd. Manufacture of natural and synthetic rubbers and rubber materials. 812,467.

NEW COMPANIES

North West Plastics Ltd. (622,193).—March 3. Capital: £100 in £1 shares. The directors are: George Isherwood, 171 Mosley Common Road, Boothstown, Lancs.; Allan Law, 34 Cliff Street, Rishton. Regd. office: Johnson Street, Tyldesley.

A. R. and F. Young Ltd. (622,278).—March 4. Capital: £1,000 in £1 shares. To carry on the business of manufacturers and processors of rubber and rubber goods, etc. The directors are: Arthur C. Young, 16 Cromwell Hill, Luton; Robert C. Young, 78 The Orchard, Twigworth, Gloucester; Frances C. Young, 16 Cromwell Hill, Luton. Regd. office: 20 Clarence Street, Gloucester.

Shirley Products Ltd. (622,422).—March 5. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in plastic materials of all kinds, etc. The directors are: John L. Richards, 10 Whitecroft Way, Beckenham, director of Luxury Flats Ltd., etc.; Audrey J. Delamore, 39 Frankland Road, London, E.4. Regd. office: 129 Cheston Avenue, Shirley.

Middleton Moulded Products Ltd. (622,364). March 5. Capital: £5,000 in £1 shares. To carry on the business of manufacturers and wholesale and retail dealers in plastic, plastic mouldings, erinoid, vulcanite, ebonite, fibre, leatheroid and all acetate plastic and synthetic materials, etc. The directors are: Leslie Booker, 78 Denton Road, Audenshaw, Lancs.; Fred Battersby, 3 York Street, Manchester 2, director of A. K. Dyson and Co. Ltd., etc. Regd. office: 3 York Street, Manchester 2.

Sterling Tyre Co. Ltd. (622,594)—March 9. Capital: £500 in £1 shares. To carry on the business of distributors, importers and exporters of tyres, and tubes of all kinds, etc. The directors are: William F. Tyzack, 59 Woodstock Crescent, N.9; Frederick J. Andrews, 423 Watford Way, Hendon, N.W.4. Regd. office: 159 High Street, Stoke Newington, London, N.16.

Plastic Machine Trading Co. Ltd. (622,635).—March 9. Capital: £1,000 in £1 shares. To carry on the business of dealers in and manufacturers of plastic and other machinery, tool makers, plastic engineers, etc. The directors are: Edward Dashwood, 114 Davenport Road, S.E.6; and Kenneth J. Smith, 6 Earlswood House, Garden Lane, S.W.2, directors of Premier Injection Mouldings Ltd. Regd. office: Silver Birches, Balcombe Road, Crawley, Sussex.

Protective Packaging (Developments) Ltd. (622,639).—March 9. Capital: £1,000 in 500 'A' and 500 'B' shares of £1 each. To carry on the business of manufacturers, importers, exporters and producers of and dealers in extruded and laminated plastic materials and all forms of containers, etc.; and to develop the processes of manufacture of packaging materials employed by Field, Sons and Co. Ltd. and those employed by Transparent Paper Ltd. Solicitors: Sydney Morse and Co., 1 Aldersgate Street, London, E.C.1.

Dorking Plastic Moulds Ltd. (623,654). — March 19. Capital: £1,000 in £1 shares. Solicitors: Aukin and Co., 5 Queen Anne Street, London, W.1.

Rubber Journal and International Plastics CLASSIFIED ADVERTISEMENTS

ARTICLES WANTED

6d. a word, Minimum 12/6. Box 2/-.

WANTED, Carter-type horizontal braiding machine, 48 carriers or more. Any condition considered. Price, etc., to:—A. Roberts and Co. (Heckmondwike) Ltd., Stone Street, Cleckheaton. (3)

48IN. to 60in. rubber mixing mill required, in good condition. Full details to:—Chief Chemist, Howard Clayton-Wright Ltd., Wellesbourne, Warwick. (6)

ARTICLES FOR SALE (SECONDHAND)

6d. a word, Minimum 12/6 Box 2/-

FOR immediate disposal 2 modern first-class condition horizontal spreading machines, each 18ft. long capacity 64in. and 72in. Each with self-contained electric drives.—Box 376. (376)

MILLS. 2 mills 48in. and 42in., each complete with drive. Can be seen working at this address. First reasonable offer accepted.—Morris Rubber Industries Ltd., High Road, Byfleet. (392)

TWO rubber spreading machines, excellent working condition, 60in. Robinson and 72in. Bridge.—Box 360. (360)

60IN x 24in. 4-bowl even friction calender with 90 h.p. variable speed drive. 4½in. Iddon strainer extruder with 30 h.p. drive. 4 Carter high speed braiding machines.—Reed Brothers (Engineering) Ltd., Replant Works, Woolwich Industrial Estate, London, S.E.18. Telephone: Woolwich 7611/6. (8)

MISCELLANEOUS

6d. a word, Minimum 12/6 Box 2/-

AVAILABLE regular supplies 20#/30#/40# mesh tyre crumb.—Box 385. (385)

MISCELLANEOUS

(continued)

MANUFACTURERS of roughing machines for rubber sheeting, sponge rubber, splitting machines, leather cloth plant, embossing plates and rollers, spreading machines and presses.—G. L. Murphy, Ltd., Imperial Works, Menston, Nr. Leeds. (238R)

REGULAR quantities high-grade, clear, flexible PVC granules. 1s. per lb. Users only.—Box 383. (383)

SCISSORS ground and set by London cutlers established over 100 years; 48 hours postal service; 1/6 per pair.—J. A. Fowler, 18/22 Bell Street, Edgware Road, London, N.W.1. PAD 1491. (74R)

SLITTING capacity available for tape production.—Phoenix Rubber Co. Ltd., 2k Buckingham Avenue, Trading Estate, Slough, Bucks. Tel. No. 22307. Grams: Phenrub, Slough. (54)

AGENCIES and REPRESENTATIVES

6d. a word, Minimum 12/6 Box 2/-

SOUTH African factory manufacturing large range of rubber moulded products including gumboots, patented carpet underlay and protective articles for miners, etc., etc., require well-introduced agents for the United Kingdom and other countries. Please apply giving full particulars of coverage offered and commissions required to:—Wayne Rubber Co. (Pty) Ltd., P.O. Box 1, Rossburgh, Natal, South Africa. (7)

APPOINTMENTS WANTED

6d. a word, Minimum 10/- Box 2/-

CHEMIST/TECHNOLOGIST/MANAGER with wide and valuable experience of high-grade surgicals, proofings, mechanicals, general rubber goods and development, seeks appointment in London area.—Box 369. (369)

APPOINTMENTS VACANT

6d. a word, Minimum 10/- Box 2/-

A VACANCY has arisen on our technical staff for a young man with initiative. Duties would include development of new projects on sponge mouldings, extrusions and all types of general mouldings. Write stating age, experience, qualifications, etc., to:—Long and Hambly Ltd., Great Billing, Northampton. (368)

A VACANCY exists for a junior rubber technologist to work on development and process control in Manchester. L.I.R.I. standard. Aged 20 to 25 years. Apply to:—Technical Superintendent, Phillips Rubbers (Manufacturing) Limited, Dantzic Street, Manchester, 4. (396)

AN opportunity exists in the rubber division of a well-known Yorkshire company, for a man of wide practical experience in the rubber industry. Applicants should be capable of supervising and training labour in mixing, calendering, extruding and moulding. The post is pensionable, and assistance with housing will be considered. Reply, stating experience, age and present salary, to:—Box 4. (4)

CHEMIST required with experience in compounding natural and synthetics and of process control. Several years' proved experience and A.I.R.I. or equivalent preferred.—Details in confidence to Long and Hambly, High Wycombe. (394)

NATIONAL COLLEGE OF RUBBER TECHNOLOGY

Northern Polytechnic, Holloway,

London, N.7.

RESEARCH ASSISTANT. Chemistry graduate required to commence in September next to study anionic polymerization with emphasis on reaction mechanisms of steriospecific systems. Suitably qualified candidates will be encouraged to take a higher degree. Rate of pay approximately £500 per annum. Further particulars on application to the Head of the National College. (397)

PLANT development and methods engineer required by established rubber company in close proximity to London. A knowledge of the latest types of tool design and mechanical presses essential. This is an excellent opportunity to join an expanding organization. A company house would be available to the successful applicant. Replies, in confidence, to:—Box 399. (399)

RUBBER chemist/technologist required by small company specializing in high-quality mechanical mouldings. Primary requirement is versatility and aptitude for practical work. Applicants should give full details of previous experience and salary level.—R. E. Components Ltd., Sapcote, Leicester. (398)

RUBBER technologist. There will shortly be an opportunity for a technologist to join the staff of a company in the vicinity of London, manufacturing a wide range of products. Applicants, preferably of A.I.R.I. standard, are invited to write, giving full details of education, experience, and salary required to:—Box 2. (2)

TECHNICAL sales engineer required by progressive Midlands firm of synthetic rubber specialists, to expand sales of new material for engineering applications. Good prospects. Apply, giving full details of experience to:—Box 395. (395)

TECHNICAL service manager. The International Synthetic Rubber Company Limited, invites applications from experienced rubber technologists for the position of technical service manager. The company, which is operating the first large scale general purpose synthetic rubber plant in Great Britain, supplies widely to the rubber industry in this country, and is developing overseas markets. The successful applicant is required to take charge of the company's technical service group and will have overall responsibility for the technical service programme. The position calls for a broad background in the technology of the rubber industry, and a qualification in this field, or in chemistry, would be an added advantage. The post requires initiative and imagination and affords excellent opportunity for a man with the right personality. The company operates generous sickness, holiday and superannuation schemes. The plant is located in the pleasant rural surroundings of the New Forest in Hampshire.—Applications should be addressed to the Personnel Manager of the company at Hythe, Hampshire, giving full details of age, experience and qualifications. (1)

APPOINTMENTS VACANT

(continued)

THE BOARD OF THE RUBBER RESEARCH INSTITUTE OF MALAYA invites applications for the appointment of assistant manager of the R.R.I. Experiment Station, Sungei Buloh, Selangor. The basic salary of the appointment will be within the scale £50 x 6 — £164 per month, point of entry being determined by qualifications and experience. Allowances range from £11 10s. to £52 10s. per month in accordance with country of domicile. An additional allowance towards education of children is payable to an employee of overseas domicile. There is a contributory provident fund. Experience of rubber planting will be welcomed but is not essential; preference will be given to candidates who hold a degree or diploma in Agriculture. The closing date for applications is 30th May, 1959. Further particulars of the appointment, duties and conditions of service together with forms of application may be obtained on application to:—The Secretary, London Advisory Committee for Rubber Research (Ceylon and Malaya), Commonwealth Institute, Imperial Institute Road, London, S.W.7. (393)

VACANCY occurs for young rubber technologist, having completed national service, of L.I.R.I. standard. Experience in footwear compound an advantage. This is an opening with good prospects. Applications, which will be treated with confidence, should be addressed to:—Sam Kay Rubber Co. Ltd., Hope Mill, Portwood Place, Stockport. (5)

WORKS chemist/rubber technologist (age 30-45 years) is required by progressive rubber company situated in Surrey. The appointment is a senior one and the successful applicant will be required to assist the chief chemist in the running of a sizeable and well-equipped laboratory as well as dealing with works problems. The company specializes in the engineering applications of rubber and the applicant should have experience in one or all of the following fields: Rubber to metal bonding; compounding to government and customers specifications in natural and synthetic rubbers; development of new products from laboratory to the production stage. Permanent superannuated position.—Write, stating age, qualifications, experience and salary to Box B.939, c/o Streets, 110 Old Broad Street, E.C.2. (377)

National College of Rubber Technology

HOLLOWAY ROAD, LONDON, N.7

The College is financed by the Ministry of Education and supported by industry. In addition to training for the Diplomas of the College, the courses offered include:

A.I.R.I.

Three-year full-time course in rubber technology. Qualification for entry: G.C.E. with at least two of the subjects chemistry, physics and mathematics at Advanced Level and the third studied to that level.

Sandwich Course for A.I.R.I.

Four-year course for employees of firms in the rubber industry prepared to send them to the College for approximately six months (two terms) of each year on full pay. Employers pay College fees; employees maintain themselves in Hall of Residence. College directs students' reading whilst at factory. Qualifications for entry as above; or L.I.R.I.; or good Higher National Certificate in chemistry with adequate physics and mathematics. Candidates not yet employed may send particulars to the College for transmission to possible employers.

Associateship Course for Graduates

One-year full-time course in either rubber or plastics.

A.P.I.

Three-year full-time course leading to the examinations for Associateship of the Plastics Institute. Qualifications as for three-year rubber course.

L.I.R.I.

One-year intensive full-time course for those at G.C.E. Ordinary Level wishing to qualify for a position of subordinate responsibility in the rubber industry. Success in this course may qualify for admission to the A.I.R.I. course.

Research Courses

Suitably qualified rubber technologists are accepted for specialized courses leading to Fellowship of the National College (F.N.C.R.T.) and higher degrees by research.

Prospectus, giving details of scholarships and all full-time, part-time and evening courses, free on application.